THE IRON TRADE REVIEW

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BUYERS ALERT

AND ACTIVITY IN PIG IRON CONTINUES.

Prices Still Climbing—Marked Scarcity of Bessemer and Basic—Higher Prices of Sheets Expected—Manhattan Bridge Contract.

Pig iron still occupies the center of the stage, the demand during the past week being very active with prices showing further advances. In some centers feverish conditions are apparently subsiding and both buyers and sellers are showing a disposition to wait, especially before entering into contracts for next year's requirements, but for the most part the week has witnessed keen anxiety in the buyers to place orders and of their failure in many cases to get iron for prompt shipment. In the south, from $15.00 to $16.00 is being obtained easily for spot shipment, and while some sales for the first half of next year have been made at $14.50, $15.00 more nearly represents the market. In the east the scarcity seems to be confined largely to steel making irons. The sales in the New York district included 25,000 tons of basic, 5,000 tons of foundry and 4,000 to 5,000 tons of gray forge. In the central west sales included 15,000 tons of basic at $18.00 valley, and 120,000 tons of Bessemer at $18.25 valley, both for delivery during the first half of next year. Both Bessemer and basic for the first half are scarce and one large buyer has not succeeded in placing an order for 75,000 tons of Bessemer. In both Chicago and Cleveland No. 2 foundry has been sold at $20.00. One large electric interest is inquiring for 16,000 tons for delivery at Allegheny and Cleveland and many other buyers are in the market. The general expectation is that still higher prices will prevail throughout the country.

Large Bridge Contract. The principal contract of the week in structural material was for 42,000 tons for the new Manhattan bridge, taken by the Jones & Laughlin Steel Co., through its Cleveland agency. Some large inquiries for bridge material are pending, but actual business in shapes is not heavy at present. The mills are, however, well supplied and are behind in their deliveries.

The demand for iron and steel bars is active. Another company has followed the leading producer in advancing the price of bar iron and some manufacturers are obtaining a premium of $2.00 per ton for prompt delivery of steel bars.

An advance of $2.00 per ton on sheet prices seems to be imminent. The mills are from 10 to 12 weeks behind on deliveries, and specifying is heavy. There is also heavy specifying on plates, but new business is not large. All western plate mills are comfortably filled with orders and eastern mills are almost as well supplied. The selling of rail and track material has not been in as large volume, but some heavy inquiries are pending. Shortage of steel promises to curtail the production of standard sections.

The demand for agricultural shapes is greater than the capacity of the mills. Merchant pipe and wire products are exceedingly active for this time of the year. The demand for boiler tubes reflects the general prosperity of the country. An advance in prices of cast iron pipe is probable on account of higher quotations on pig iron.

Speculation in Scrap. Although the scrap iron market continues to show greater activity, there are indications of considerable speculation among dealers and actual buying by consumers has not greatly increased.

LARGE CONTRACTS

Awarded by the Indiana Steel Co. and the Bethlehem Steel Co.

The United Engineering & Foundry Co., of Pittsburg, has during the past ten days secured two of the largest contracts for new mill equipment placed under single contracts.

From the Indiana Steel Co., for its Gary plant, the company secured a contract for one continuous rail mill comprising four 40-inch, two high blooming mills; one 40-inch, three high blooming mill; one 27-inch roughing rail mill, three stands; one 27-inch forming mill, one stand; and one 27-inch finishing mill, three stands, including all intervening tables, five hot saws, transfers, and one horizontal bloom shear, the weight of this mill to be 13,000,000 pounds. All these mills are to be electrically driven, the Allis-Chalmers company securing the contract for the generators and the Westinghouse interests the blowing engines.

This is the largest mill and table contract that has been let under one contract.

The second large contract secured by the United Engineering & Foundry Co. was from the Bethlehem Steel Co. and consists of an entirely new rail mill and a new structural mill. The former, which is a 28-inch rail mill, consists of one one-stand, three high rougher and one two-stand, three high finisher, and includes all tables, transfers, hot beds, manipulators, five hot saws, one cold saw, cambering machine and structural saw, six rail straighteners, complete out to the finishing end, including drill presses.

The second Bethlehem contract is for one 28-inch structural mill consisting of one three-stand, three high roll train, and includes all tables, transfers, hot beds, pushers, sliding from saw, and two roller straightening machines.

All the machinery included in these contracts is of the design of the United Engineering & Foundry Co. The Gary mill will be delivered within one year and the Bethlehem mills within nine months.

A contract was also obtained from the Newport Rolling Mill Co. for a 34-inch blooming mill and a 24-inch sheet bar mill.

THE WEEK IN IRON CENTERS.

PITTSBURG.

Bessemer Pig for First Half Almost Exhausted.—Sheet Bars Advanced.

Office of THE IRON TRADE REVIEW. }
521 PARK BUILDING, AUG. 21 }

Present conditions are ideal from a selling standpoint and the only feature which is causing any uneasiness whatever is the pig iron market, which, from the consumers' standpoint, is conducive to almost anything but easiness of mind. The fact that in August, three months before the subject is usually brought up for serious consideration, practically all the Bessemer pig iron for the first half of next year has been sold, and at prices much above anything that was suspected three months ago, has caused no little consternation and the sale of 100,000 tons last week at $17.75, valley furnace, was an eye-opener, but this week, when one concern sold 120,000 tons of Bessemer at $18.25, valley, for delivery through the first half of next year, a few of the consumers who have not covered almost gasped for breath and began to get busy in order to cover for their requirements. The Westinghouse interests, usually the barometer, are now in the market for 16,000 tons of foundry iron, and the Republic Iron & Steel Co., within the past few days, tried to secure a good round tonnage for first half delivery and was told that it could not be taken, on account of the sold-up condition of the furnaces. While the statement is probably considerably exaggerated, one furnaceman said within the past two days that 75,000 tons would take all the available first quarter Bessemer iron in the valleys.

The Carnegie Steel Co., has advanced the price of sheet bars to $30 on its monthly contracts and other lines of semi-finished material are almost impossible to secure. Small billets have sold as high as $32, Pittsburg, but this was an exception, the nominal market for Bessemer billets being about $29.

Light rails have also been advanced $1 per ton. In other finished lines there is a tremendous pressure to make deliveries, specifications and new business being far in excess of mill shipment. Steel bars are in excellent demand and the market in a very healthy condition. The leading interest is maintaining its price at 1.50c Pittsburg, although the Republic on new business has quoted 1.55c and the Cambria Steel Co., two weeks ago, as stated in these columns at the time, announced its price as 1.60c.

From well informed sources comes the prediction that before the end of the year the output of finishing mills will be curtailed on account of the scarcity of pig metal. Within the next two weeks two new furnaces will go into blast in this district, one the No. 2 Hazelton furnace of the Republic Iron & Steel Co., and the other that of the Midland Steel Co.

Pig Iron.—As has been the case during the past month, pig iron has been the feature in this market during the week under review, and there has been a tremendous inquiry for iron for delivery extending through the first half of next year. Prices are still advancing in spite of the conservative influences which have been trying to prevent a runaway market. The Westinghouse Electric is out with an inquiry for 16,000 tons of northern foundry iron for delivery at Allegheny and Cleveland, during the first half of next year; the Republic Iron & Steel Co. has a big inquiry out for Bessemer and there are several other large inquiries in the market without any available iron to fill them. During the past week W. P. Snyder sold 15,000 tons of basic at $18, valley, and 120,000 tons of Bessemer at $18.25 valley for first half delivery and for what little Bessemer iron is to be had for small buyers for delivery during the remainder of the present year as high as $18.50 valley, has been paid. Cambria Steel Co. has been one of the buyers during the week.

Northern foundry iron for prompt shipment is almost an impossibility, and current prices are being quoted for first quarter delivery. Northern foundry is quoted $18 to $18.25, valley, and a sale of No. 2 southern, 1,000 tons, is reported at $15.50, Birmingham, although this could probably be shaded 25 cents on a large lot. Several of the valley furnaces have entirely sold up for the remainder of the year on foundry and have refused to quote on inquiries for delivery during the remaining months of the present year. They have also refused, at this early date, to quote on next year, preferring to wait until nearer the delivery period. We quote:

Bessemer Valley	18.00 to 18.25
Bessemer, Pittsburg	18.85 to 19.10
No. 1 Foundry, Pittsburg	19.10 to 19.35
No. 2 Foundry, Pittsburg	18.85 to 19.10
Gray Forge, Pittsburg	17.35 to 17.60
Basic, Valley	17.75 to 18.00
Basic, Pittsburg	18.60 to 18.85

Ferro-Manganese.—On ferro-manganese, foreign, 80 per cent, for October and November deliveries, we quote $85 to $87.50 and for September delivery, $90.

Steel.—The steel situation has not improved a particle and is as scarce now as it has been at any time during the present stringency. The Carnegie Steel Co., at its monthly adjustment Sept. 20, advanced the price of sheet bars to $30, Pittsburg, on its monthly contracts. While $28 is quoted as the nominal market on Bessemer billets and $29 on open-hearth, there has been none of either offered by producers and $30 has been paid for open-hearth during the past week. The extreme pressure on the finishing mills has consumed all the surplus there might have been, and mills are behind on old contracts, in some instances as much as a month or six weeks.

Skelp.—While there has been no inquiry of note for skelp, the producers have advanced their prices from 50c to $1 per ton and on narrow widths and light gauges, we quote as follows:

Bessemer, grooved, 1.62½c to 1.67½; sheared, 1.67½c to 1.72½c; basic, grooved, 1.65c to 1.70c; sheared, 1.70c to 1.75c; iron skelp, grooved, 1.80c to 1.85c; sheared, 1.90c to 2c.

Muck Bar.—We quote a nominal market at $31, delivered Pittsburg, with but little inquiry from consumers.

Hoops and Bands.—The specifications against existing contracts are fair, but the new buying has not been heavy. The National Cooperage Association, at the annual meeting in Chicago last week, took no action, the feeling being in favor of delaying contracting for a time, at least. We quote:

Hoops, 1.90c in carload lots, and 2c on less than carload lots, bands, 1.50c base, half extras as per standard steel card. Prices f. o. b. Pittsburg.

Structural Material.—The new business has not been heavy, but specifications have been coming in faster than mill shipments can be made, and deliveries have not improved. The leading interest is practically filled for the remainder of the year, but independents are in shape to make deliveries in from forty to sixty days. There has been no change in prices and we quote as follows:

Beams and channels, 15 in., and under, 1.70c; over 15 in., 1.80c; zees, 1.70c; tees, 1.75c; angles from three to six inches, inclusive, 1.70c; over six inches, 1.80c; universal and

sheared plates, 6¼ inches and wider, 1.60c base.

Plates.—Plates, both sheared and universal, are in very strong demand and some large inquiries are being received from the mills from the steel car companies which are already figuring on much new business for next year delivery. The railroads are coming in early with their inquiries for new rolling stock, and it is variously estimated that these inquiries amount, at the present time, to close to 50,000 cars. Plate for large riveted pipe is becoming quite a factor and Philadelphia will probably straighten out its tangle during the present week and a large contract will be finally let. We quote:

Tank plate ¼ inch thick, 6¼ to 100 inches, 1.60c f. o. b. mill, Pittsburg. Light plate schedule, No. 10, 1.70c; Nos. 11-12, 1.75c; Nos. 13-14, 1.80c; Nos. 15-16, 1.90c. Extras on the regular plate schedule are as follows per 100 pounds, boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary firebox steel plates, 0.20c; still bottom steel, 0.30c: marine steel, 0.40c; locomotive firebox steel, 0.50c; all sketches excepting straight taper plates, varying not more than four inches, in width at ends, narrowest end not being less than less than 30 inches, 0.10c; complete circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50c; over 130 inches, 1.00c. Gauges under ¼ inch to and including 3-16 inch plates on thin edges, 0.10c; under 3-16 inch to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms net cash in 30 days.

Sheets.—The specifications for sheets have been very heavy, and there is a lot of new business in sight. On account of mill conditions, it may be necessary to sell into next year earlier than usual, there being a disposition on the part of jobbers to cover ahead as far as the policy of the producers will permit. This condition is general, especially as far as the first quarter is concerned, but only in isolated cases have contracts for this very forward delivery been made. The advance in sheets is expected next week. We quote:

Black steel sheets, box annealed, cold rolled, one pass: Nos. 11-12, 2.10c; Nos. 13-14, 2.15c; Nos. 15-16, 2.20c; Nos. 17-21, 2.25c; Nos. 22-24, 2.30c; Nos. 25-26, 2.35c; No. 27, 2.40c; No. 28, 2.50c; No. 29, 2.65c; No. 30, 2.75c. Galvanized, Nos. 10-11, 2.45c; Nos. 12-14, 2.55c; Nos. 15-16, 2.65c; Nos. 17-21, 2.80c; Nos. 22-24, 2.95c; Nos. 25-26, 3.15c; No. 27, 3.35c; No. 28, 3.55c; No. 29, 3.80c; No. 30, 4.05c. Corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation; $3.10 per square for No. 28 galvanized, 2½-inch corrugation. Quotations f. o. b. Pittsburg on large lots.

Tin Plate.—The demand for tin plate is heavy, but not to the extent it applies to sheets. There is plenty of new business in sight and the canning interests which had not already specified are now doing so and urging deliveries, which are from eight to 14 weeks behind.

We quote: $3.75 per base box, f. o. b. Pittsburg, 14 x 20 100-pound cokes, terms 30 days, less two per cent off for cash in ten days.

Merchant Pipe.—The amount of new tonnage being placed during the past week has been well up with the business of the preceding weeks and while there have been no particularly large contracts, the small lots have been desirable and in the aggregate amounted to a large business. The merchant pipe trade, from a tonnage standpoint, is very heavy. The discount to the large trade is 81 per cent and 5 off. We quote the following official discounts, consumers' carloads, with jobbers' discounts one point higher.

	Steel		Iron	
Consumer's Carloads	Black	Galv.	Black	Galv
⅛ and ¼ inch	71	55	67¼	51¼
⅜ inch	73	59	69½	55½
½ inch	75	63	71½	59½
¾ to 6 inches	79	69	76	66
7 to 12 inches	74	59	71	55½
EXTRA STRONG PLAIN ENDS.				
⅛ to ⅜ inch	64	52	60½	48¼
½ to 4 inches	71	59	67½	55½
4½ to 8 inches	67	55	63½	51½
Double extra strong plain ends, ¼ to 8 inches	60	49	56½	45½

Boiler Tubes.—New tonnage in boiler tubes has been heavy and the specifications against contracts have been large, mills having business to keep them going full practically for the next three or four months. Prices are unchanged as follows:

	Steel	Iron
1 to 1¼ inches	50	45
1¾ to 2¼ inches	62	48
2½ inches	64	50
2¾ to 5 inches	70	57
6 to 13 inches	62	45

Less than carload lots two points less.
2½ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Wire and Wire Nails.—Each summer month, from a mill standpoint, has been better than its predecessor, and new business being placed has been good, although at the present time mills are not urging the trade to go in very heavy, preferring to take things as they come along until the time arrives when conditions can be better sized up for the remainder of the year. There is a strong feeling that within the next two weeks prices will be advanced. We quote as follows:

Wire nails, jobbers' carload lots, $1.85; retailers' carload lots, $1.90, and less than carload lots, $2; painted barb wire, $2 for jobbers in carloads; retailers in carloads, $2.05, and less than carloads, $2.15, with 30c for galvanizing; plain wire, $1.70 to jobbers and $1.75 by carload.

Rails and Track Material.—The Carnegie Steel Co. is cleaned up on standard sections for the remainder of the year, having taken business to run its rail mill full until Jan. 1. During the week under review the inquiries have been only fair, and the new business did not exceed 25,000 tons, in small orders. The demand for light rails is very heavy and deliveries are from six to eight weeks. Announcement of an advance of $1 per ton on light sections was made this week. We quote as follows.

Fifty pounds and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; light rails, 16 pounds, $31; 20 pounds, $32; 25 to 45 pounds, $30 to $31; angle bars for standard sections, 1.50c; spikes, $2.20 to $2.25.

Merchant Bars.—There has been some business moving, all on the 1.60c Pittsburg price, and there is a strong probability of a still further advance of $2 per ton, on account of the sold-up condition of the mills and the comparatively small production. We quote:

Common iron bars, 1.60c, Pittsburg, in carload lots, 1.65c in less than carloads; Bessemer steel bars, 1.50c; plow and cultivator, 1.50c net; channels, angles, zees and tees, under three inches, 1.60c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds, of a size, 0.30c advance.

Steel Bars.—There has been a large amount of new business and the specifications against existing contracts are very heavy, exceeding mill shipments by a large margin, and the market is in a very healthy condition. While the leading interest has held firmly to its 1.50c price, the Republic Iron & Steel Co., has quoted 1.55c Pittsburg and the Cambria Steel Co., two weeks ago, announced its price as 1.60c. As far as can be learned no large business has as yet been done at the advanced price, although it has been paid as a premium for prompt delivery. We quote:

Cold rolled and ground shafting, 50 per cent off in carload lots, and 45 off

in less than carloads, delivered in base territory; tire steel, 1.70c to 1.80c; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flat, 1.50c to 1.55c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.05c to 2.10c. The price of planished and machine straightened tire is 1.70c base half extras as below. Iron finished tire up to 1½ inch by ½ inch, 1.65c base half extra tire list. Iron finished tire 1½ inch by ½ inch and over to be sold on regular bar basis of 1.50c base, half extra steel card.

Old Material.—There is a feeling of unrest in the scrap market, and a majority of the dealers are trying to buy in anticipation of an advancing market. While there have been several sales, they have not been of any large tonnage and until they are forced to do so consumers are not inclined to pay the high prices being asked. We quote as follows: Heavy melting scrap, $16.75 to $17; No. 1 cast scrap, $16 to $16.50; cast borings, $9 to $9.50; bundled sheet scrap, $14 to $14.50; malleable scrap, $15.50 to $16; No. 1 railroad wrought scrap, $17; low phosphorus scrap, $19.50 to $20; wrought turnings, $12 to $12.25; busheling scrap, $14 to $14.50; iron axles, $26 to $26.50; old rails, rerollers, $17.25 to $17.50.

Coke.—With the scarcity of both furnace and foundry coke, there is a strong probability of an advance within the present week. Prices are very strong and furnace coke, especially is scarce. Every available oven in the region is being put in blast and contractors are being urged to rush to completion their work on new projects. For spot shipment $3.40 to $3.50 is quoted on foundry coke and for contract coke calling for extended deliveries $3.25 to $3.40. On furnace coke we quote $2.75 to $2.85. For the week ending August 11, the estimated production of the Connellsville region was 298,843 tons, and for the lower Connellsville region, 107,011 tons.

CHICAGO.

Pig Iron Scarce and Prices Higher.—Sheets and Bars May be Advanced.

Office of THE IRON TRADE REVIEW, 1262 Monadnock Block, Aug. 21

The scarcity of foundry and steelmaking irons grows more acute each day. The brakes are down hard and fast, but despite that fact values continue to rise. Southern No. 2 is now selling at a minimum of $15, Birmingham, for forward deliveries, and $15.50 to $16 for spot shipment, while northern irons have advanced to a minimum of $19.50 furnace, or $20 Chicago. Deliveries are extremely bad and everybody is short. Large steel makers feel the shortage most keenly, several of them being unable to operate their plants to fullest capacity in consequence. One concern is negotiating for a round tonnage of low phosphorus irons abroad.

The Illinois Steel Co. has positively withdrawn from the market for billets and may find it necessary to trim the contracts it has accepted from outside sources because of the increasing requirements of its finishing mills. Advances in several materials are imminent, sheets and steel bars being the most likely to experience the first jump. It is definitely announced that no change will be made in the wire schedule, although the leading producer has been forced several times to purchase rods in the open market.

Bar iron can still be bought on the basis of 1.50c Pittsburg, or 1.66½c Chicago, although the advance of $2 a ton made a week ago by the Republic Iron & Steel Co., and since adopted by another local concern, has materially strengthened the market. Old material has also profited by the change and is selling one or two points higher. Specifications and new tonnage are heavy, but deliveries show no improvement.

Pig Iron.—The principal transactions this week were in steel making irons. The Inland Steel Co., which was reported figuring on 25,000 tons of basic, bought a round lot from valley and Virginia furnaces. The American Steel Foundries bought close to 5,000 tons and St. Louis melters took about 8,000 tons. The Grand Crossing Tack Co. also bought a round lot a couple of weeks ago. Deliveries on much of this tonnage run into the first quarter of next year. Low phosphorus irons are also in active demand, and one Indiana melter is negotiating with English furnaces for a supply. The American Steel Foundries bought 2,000 tons from England in the latter part of July at about $2 a ton below the domestic price. Basic iron has materially strengthened under the present active demand, Virginia furnaces asking $17 for their product, and valley stacks $17.75. Foundry irons are higher in price, and not any more plentiful. Southern deliveries are very poor and spot iron is eagerly sought after. For immediate shipment, $16, Birmingham, can easily be obtained. There is a brisk buying movement for next year's delivery, for which $15 Birmingham is the ruling price. Northern irons have advanced $1.00 a ton, No. 2 foundry now selling on the basis of $19.50 furnace. Malleable Bessemer is also quoted at this price. Lake Superior charcoal has sold as high as $20 Chicago, but a little can still be obtained at 50 cents less. We have revised our prices, and quote Chicago delivery as follows.

Lake Superior charcoal	$19.50 to 20.00
Northern Foundry No. 1	20.00 to 20.50
Northern Foundry No. 2	19.50 to 20.00
Northern Foundry No. 3	19.00 to 19.50
Northern Scotch Foundry	20.00 to 20.50
Ohio Strong Softeners No. 1	19.55 to 19.80
Ohio Strong Softeners No. 2	19.05 to 19.30
Southern Foundry No. 1	19.40 to 19.90
Southern Foundry No. 2	18.90 to 19.40
Southern Foundry No. 3	18.40 to 18.90
Southern Foundry No. 4	17.90 to 18.40
Southern No. 1 Soft	19.40 to 19.90
Southern No. 2 Soft	18.90 to 19.40
Southern Gray Forge	16.65 to 17.15
Southern Mottled	16.40 to 16.90
Southern Silveries (4 percent to 6 percent Silicon)	18.40 to 18.90
Jackson Co. Silveries, 8 to 10 percent Silicon	23.80 to 24.30
Alabama and Georgia Car Wheel	24.40 to 24.90
Malleable Bessemer	19.50 to 20.00
Standard Bessemer	20.30 to 20.55
Basic Iron	19.85 to 20.05

Billets and Rods.—The scarcity of crude steel is keenly felt by all consuming interests. The Illinois Steel Co. has withdrawn all quotations on billets, and will accept no more orders for this product. The corporation has not enough crude steel to supply its own wants, and on several occasions recently various of the constituent companies have had to buy in the open market to supply their pressing needs. The local interest is still filling the contracts it has accepted, but there is a possibility that even these may be canceled owing to the pressure for material felt in its own plant. This condition has perceptibly strengthened the market, and those producers that have forging billets for sale are asking from $35 to $37. Wire rods and sheet bars are even harder to obtain, the American Steel & Wire Co. having withdrawn from the market on the former and the Tennessee and Republic interests on the latter. Sheet bars are held at $29 to $29.50, Pittsburg, and wire rods at $33, Pittsburg.

Iron and Steel Bars.—There is an extremely active demand for iron and steel bars. The new price of bar iron based on 1.60c Pittsburg, or 1.76½c Chicago, has been adopted by one other interest in this district. Steel has felt the impetus of this advance, and in conjunction with the insatiable inquiry, there has developed among sellers a strong feeling for an advance of $2 a ton in this product also. The leading manufacturers are anxious for it, if only to steam the tide of orders. These have been pouring in at an unprecedented rate and most of the mills are behind in their shipments. All makers are sold up until next July, while some have considerable tonnage booked for delivery after that date. No large contracts for bar iron were made here this week, though the routine trade was of excellent proportions. We quote mill prices, Chicago delivery, as follows:

Bar iron, 1.76½c; soft steel bars

and bands, 1.66½c, half extras; soft steel angles, less than 3 x 3, 1.76½c; hoops, 2.06½c base, full extras; old rail stock, 1.65½c. Jobbers report a good demand from stock, with prices firm. We quote bar iron, 2.20c, full extras; soft steel rounds and squares, 3 inches and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; flats, 2 inches to 4 inches by 1⅛ inch and larger, $2 per 100 pounds base; flats, 4½ inches x 5 inches and 6 inches x 5-16 inch and thicker, $2 per 100 pounds base; all ovals, half rounds, $2 per 100 pounds base; steel bands, $1.85 to $1.95 half extras; soft steel hoops, $2.30 to $2.40 full extras. Other sizes not mentioned above, $1.85 per 100 pounds base, plus half extras.

Wire Products.—Current business continues to exceed that of any similar day in 1906. Manufacturers, while doing their best to keep up with specifications, are falling further and further behind, not being able to get raw material in sufficient quantities to operate their plants to fullest capacity. This statement applies with equal force to the American Steel & Wire Co. as to the numerous independent plants. It is interesting to note that while filling contracts for wire rods, the leading interest has found it necessary several times to buy material in the open market to supply its own needs. Prices are unchanged, and there is little prospect now that the talked-of advance will be made. We quote to jobbers, mill shipments, Chicago delivery, as follows:

Wire nails, $2; painted barbed wire, $2.15; galvanized barbed wire, $2.45; smooth annealed wire, $1.85; smooth, galvanized wire, $2.15; polished staples, $2.15; galvanized staples, $2.40. Carload lots to retailers, 5 cents higher than above prices; less than carload lots, 15 cents higher.

Sheets.—No product is more strongly intrenched than sheets. An advance of $2 a ton is expected this week, and orders for the black, galvanized and corrugated products have greatly increased in consequence. Specifications are extremely heavy, the output of mills being insufficient to cope with same. Sheet bars are harder to obtain than ever before, and those plants that have not a supply assured are experiencing considerable difficulty and suffering no little loss in completing their contracts. Deliveries on black sheets are about ten weeks behind, and on galvanized three months is the best that can be done. With the reservation that prices may be advanced $2 a ton before this issue is off the press, we quote mill prices, Chicago delivery, as follows:

Nos. 8, 9 and 10, 1.96½c; Nos. 11 and 12, 2.01½c; Nos. 13 and 14, 2.06½c; Nos. 15 and 16, 2.16½c; box annealed; Nos. 18 and 20, 2.36½c; Nos. 22 and 24, 2.46½c; No. 26, 2.51½c; No. 27, 2.56½c; No. 28, 2.66½c; No. 29, 2.81½c; No. 30, 2.91½c. Jobbers' prices on less than carload lots from store are as follows: No. 10, 2.20c; No. 12, 2.25c; No. 14, 2.30c; No. 16, 2.40c; Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.70c; No. 26, 2.75c; No. 27, 2.80c; No. 28 2.85c; No. 30, 3.30c.

Galvanized sheets, mill shipments, are as follows: Nos. 10 and 11, 2.56½c to 2.61½c; Nos. 17 and 21, 2.91½c to 2.96½c; Nos. 22 and 24, 3.06½c to 3.11½c; Nos. 25 and 26, 3.26½c to 3.31½c; No. 27, 3.46½c to 3.51½c; No. 28, 3.71½c to 3.76½c; No. 29, 3.91½c to 3.96½c; No. 30, 4.16½c to 4.21½c. From store, prices on less than carload lots are as follows: Nos. 10 to 20, 3.10c to 3.20c; Nos. 22 and 24, 3.25c to 3.35c; No. 26, 3.45c to 3.55c; No. 27, 3.65c to 3.75c; No. 28, 3.85c to 3.95c; No. 30, 5.05c to 5.15c.

Plates.—Routine tonnage continues of excellent proportions. All the western mills are comfortably filled with orders, and owing to the shortage of raw material are none too anxious to add to their obligations just at present. Deliveries are good under present circumstances, though specifications keep considerably ahead of capacity. Prices are strong, mill shipments, Chicago delivery, being quoted as follows:

Tank steel, ¼-inch and heavier, up to 100 inches wide, 1.76½c base; flange steel, 1.86½c base; marine steel, 1.96½c base; all full extras. Plates 3-16 inch thick, $2 extra; gauges, 7 to 8, $3 extra; No. 9, $5 extra. Less than carload lots, $5 extra. We quote from local stocks; tank steel ¼ inch and heavier, up to 72 inches wide, 2c to 2.10c; 72 inches up to 96 inches wide, 2.10c to 2.20c; 3-16 inch up to and including 60 inches wide, 2.10c to 2.20c; 3-16 inch, 72 inches wide, 2.35c to 2.45c; No. 8, up to 60 inches wide, 2.15c to 2.25c; flange steel, 25c extra; heads, 25c extra.

Structural Steel.—The only contract of importance closed this week in the west is for the Ford building at Detroit, which will require about 4,000 tons of structural shapes. The American Bridge Co. was awarded this order. A western road is figuring on 5,200 tons of fabricated bridge material, while another road has ordered 400 tons. The Carnegie and Illinois Steel companies are practically out of the market for 1907 on all kinds of structural material, and it is somewhat difficult under the circumstances to secure satisfactory delivery on additional tonnages. Prices are very firm, mill shipments, Chicago delivery, being quoted as follows:

Beams and channels, 3 to 15 inches, inclusive, 1.86½c; angles, 3 to 6 inches, 1.86½c; angles, larger than 6 inches, on one or both legs, 1.96½c; beams, larger than 15 inches, 1.96½c; zees, 3 inches and over, 1.86½c; tees, 3 inches and over, 1.91½c, with the usual extras for cutting to exact lengths, punching, coping, bending, or other shop work.

Quotations on lots from store are as follows: All angles three inches and larger, including six inches, $2.25 per 100 pounds base; angles over six inches, $2.35 per 100 pounds base; tees, three inches and larger, $2.30 per 100 pounds base; beams, three inches to fifteen inches, inclusive, $2.25 per 100 pounds base; beams, eighteen inches and larger, $2.35 per 100 pounds base; channels, three inches and larger, $2.25 per 100 pounds base.

Rails and Track Supplies.—Some inquiry for rails still exists, but aside from that of the M., K. & T. for 18,000 tons, which is still unplaced, nothing of a conspicuous character has come out. Demand for track supplies has also declined, while western tonnage for light rails is going almost entirely to eastern mills owing to the inability of the Illinois Steel Co. to give deliveries within three months. Shipments of standard sections are experiencing some delay because of the shortage of steel, and the prospects are that a larger tonnage than usual will be carried over into 1907 by the local mill. Quotations are as follows:

Standard sections, f. o. b. mill, open-hearth rails, $29; Bessemer, $28; light rails, Bessemer steel, 30 to 45-pound sections, $28.50; 25-pound, $29.50; 20-pound, $30.50; 16-pound, $31.50; 12-pound, $32.50, and lighter sections down to eight pounds, $29.50 to $41.50, all f. o. b. mill. Track supplies are quoted as follows: Angle bars, 1.50c to 1.75c; spikes (for quick shipment), 2.15c to 2.25c; for forward deliveries, 2c; track bolts (for quick shipment), 2.65c to 2.75c base; square nuts (for forward deliveries), 2.50c.

Merchant Steel.—The demand for agricultural shapes is unprecedented, and far beyond the capacity of mills. New tonnage is of insignificant proportions, as the leading makers some time ago withdrew from the market. Prices are extremely firm, mill shipments, Chicago delivery, being as follows:

Planished or smooth finished tire steel, 1.86½c; iron finish, up to 1½ x ½ inch, 1.81½c; iron finish, 1½ x 1½ inch and larger, 1.66½c, base; channels for solid rubber tires, ¾ to 1 inch, 2.16½c, and 1⅛ inch and larger, 2.06½c; smooth finished machinery

steel, 1.91½c; flat sleigh shoe, 1.71½c; concave and convex sleigh shoe, 1.96½c; cutter shoe, 2.35c; toe calk steel, 2.21½c; railway spring, 1.86½c; crucible tool steel, 6½c to 8c, and still higher prices are asked on special grades. Shafting, 50 per cent off in car lots and 45 per cent in less than car lots, in base territory.

Boiler Tubes.—Jobbers continue to specify freely and mills have all the tonnage they can comfortably handle. The outlook is bright, the exceedingly strong conditions prevailing in all other steel products having eliminated all shading of prices. Prices are unchanged as follows:

	Steel	Iron	Seamless
1 to 1¼ inches	46.35	43.35	53.35
1¼ to 2¼ inches	58.35	43.35	40.35
2¼ inches	60.35	48.35	43.35
2¼ to 3 inches	68.35	55.35	
2¼ to 4½ inches (Seamless)			50.85
6 to 13 inches	58.35	43.35	

Less than carload lots, from store, as follows:

	Steel	Iron	Seamless Steel
1 to 1¼ inches inclusive	40	35	42½
1¼ to 2¼ inches, inclusive	50	35	35
2½ inches, inclusive	52½	35	36
2¾ to 3 inches, inclusive	60	47½	42½

Merchant Pipe.—Demand is far in excess of the volume of business for the same period in any previous year. Stocks everywhere are low, and practically the entire output of mills goes into immediate consumption.

We quote on the base sizes, ¾ to 6-inch black steel pipe, 79.35 per cent discount, and 69.35 Chicago for galvanized pipe. Quotations on material from stock remain at 76 to 77 per cent discount on the base sizes ¾ to 6-inch black steel pipe.

Cast Iron Pipe.—There are no transactions of unusual importance to record this week. Routine demand is good and shipments are keeping up to specifications. Prices are very firm, an advance being probable at an early date owing to the increasing cost of pig iron. We quote for Chicago delivery, as follows: Four-inch water pipe, $33; 6, 8, 10 and 12-inch pipe, $32; larger sizes, $31; gas pipe, $1 extra.

Coke.—Prices of coke have hardened in sympathy with the rising tide in pig iron. Connellsville foundry brands are now offered at $3 to $3.10, ovens, or $5.65 to $5.75, Chcago. Solvay coke is selling on the same basis, and is in excellent demand at these prices. The local ovens have practically their entire output taken for the whole of next year. Virginia cokes are quoted at $2.75 to $3, ovens.

Old Material.—On the surface, the scrap market seems to be enjoying considerable activity. It is a fictitious state of affairs, however, as only a small portion of the material bought and sold goes into consumptive channels. All the large consumers in this territory are amply covered for the balance of the year and present prices of scrap do not interest them. Occasionally, a dealer who is sold short pays the advanced price, and fills his contract, but these are the only instances in which the material being traded in to bolster up the market reaches the smelter. Scrap is plentiful everywhere and there is no warrant for any undue excitement. Cast iron is the only material that is in healthy demand, many foundries now using it more liberally because of the shortage of pig iron. Unsettled conditions make it difficult to accurately quote prices, but those given below are a conservative estimate of the market. Gross tons are given in the first paragraph.

Old Steel Rails (4 feet and over)	$17.00 to 17.50
Old Steel Rails (less than 4 feet)	15.50 to 16.00
Old Car Wheels	18.50 to 19.00
Old Iron Rails	22.00 to 22.50
Relaying Rails, subject to inspection	28.00 to 30.00
Heavy Melting Steel	15.00 to 15.50
Mixed Country Steel	12.50 to 13.00

We quote net tons, as follows:

No. 1 R. R. Wrought	$15.50 to 16.00
No. 2 R. R. Wrought	14.50 to 15.00
Shafting	17.00 to 17.50
Dealers' Forge No. 1	13.00 to 13.50
Wrought Pipe and Flues	11.00 to 11.50
No. 1 Cast, 150 pounds and less	14.50 to 15.00
No. 1 Mill	9.50 to 10.00
Mixed Busheling (No. 1 & No. 2)	10.00 to 10.50
Country Sheet	8.00 to 8.50
No. 1 Boilers Cut	10.00 to 10.50
Boiler Punchings	12.00 to 12.50
Iron Car Axles	23.00 to 23.50
Steel Car Axles	18.50 to 19.00
Iron Axle Turnings	10.00 to 10.50
Cast Borings	8.00 to 8.50
Mixed Borings, etc	8.00 to 8.50
Machine Shop Turnings	9.50 to 10.00
Railroad Malleable	13.50 to 14.00
Agricultural Malleable	13.50 to 14.00
Stove Plate and Light Cast Scrap	12.75 to 13.25
Old Iron Splice Bars	18.00 to 18.50

CLEVELAND.

Disappointing Ore Shipments.—Pig Iron Stronger.—Scrap Improves.

Office of THE IRON TRADE REVIEW, BROWNING BUILDING, Aug. 21

Iron Ore.—Every week sees a shading of earlier estimates of the season's movement of ore. While every effort is being put forth it is a fact that by reason of great purchases of the range railroads and of the coal-carrying roads at the southern end of the lakes and also because of labor scarcity about the mines, the movement is proving considerably smaller than had been expected. The 6,000,000-ton point is now out of the question and it is improbable that the August movement will exceed that of July. No further developments have come to light in the 1907 ore situation. Furnace interests are insisting on an early movement and are opposed to any advance, while ore producers are postponing sales as far as possible and intimate that small advances over this year will prevail.

Pig Iron.—The market is stronger than a week ago with prices advanced. The past fortnight has seen heavy sales in foundry and malleable, with considerable tonnage of basic and pending inquiries for foundry iron in local market for delivery through the first and second quarters will aggregate about 30,000 tons. Of this 16,000 is sought by Westinghouse interests, 7,000 tons for the West Allegheny works and 9,000 tons for Cleveland. This is for first and second quarter delivery and is carefully graded according to silicon and phosphorus. Practically no spot iron is available in this district. One sale of 100 tons of No. 2 foundry was recently closed at $20 Cleveland, but another inquiry of 300 tons has gone the rounds without finding a taker. The Bessemer Association, at its meeting in Cleveland, Saturday, found that it had no iron in market for the remainder of this year or the first quarter of next, and declined to sell ahead of that time. This hesitancy in regard to second quarter sales is quite general and some interests have declined all orders later than the first of the year. Basic is quoted at $18.00, valley, for the first half. Some $17.75 Bessemer can be had for 1907; however, in one instance, it is stated, $18.25 has been secured. We quote f. o. b. Cleveland as follows:

Bessemer	$18.65 to 18.85
No. 1 Foundry	18.50 to 18.75
No. 2 Foundry	18.25 to 18.50
No. 3 Foundry	17.50 to 18.00
No. 2 Southern	18.00 to 18.85
Gray Forge	17.00 to 17.50
Gray Forge Southern	16.00 to 16.50
Lake Superior charcoal	19.50 to 20.00

Coke.—Spot coke is exceedingly scarce. One sale of a good lot of furnace coke, however, is reported at $3.00; for strictly A1 foundry coke $3.25 to $3.50 is being secured. Producers are declining to quote for delivery after Jan. 1.

Finished Material.—The feature of the week has been the closing to the Cleveland agency of the Jones & Laughlin Steel Co. of the contract for the steel for the Manhattan bridge aggregating 42,000 tons. The Cuyahoga county court house, on which bids are being tabulated, will require between 2,000 and 2,500 tons of structural steel, but controversy over sandstone and granite for construction will probably delay this contract for some time.

The extreme heat of the past fortnight has reduced the output of local bar mills and foundries to a considerable extent and the present production is not meeting the demand in this district. Sheets are strong, with delivery in from eight to ten weeks' time for all except galvanized, which is three months behind. Structural materials and plates continue in good demand. The bulk of the strictly local business consists of small lots and goes principally to jobbers. Some billet sales are being made at the level which has lately prevailed.

Old Material.—The improved tone apparent for the past few weeks continues. Mills are buying in considerable

amounts and prices are advancing, although not sufficiently to change our quotations of last week. These are as follows, Cleveland delivery, gross tons being given in the first paragraph:

Old iron rails	$23.50 to 24.50
Old steel rails (over 6 feet)	17.50 to 18.50
Old steel rails (under 6 feet)	17.00 to 17.50
Old car wheels	17.00 to 17.50
Steel boiler plate	14.50 to 15.00
Steel axles	19.00 to 20.00
Malleable iron (railroad)	16.50 to 17.00
Malleable iron (agricultural)	13.50 to 14.00
Heavy steel	16.00 to 16.50
Country mixed steel	14.00 to 14.50

We quote net tons as follows:

No. 1 R. R. wrought	16.00 to 16.50
No. 1 busheling	13.50 to 14.00
No. 1 machine cast	14.00 to 14.50
Iron axles	23.00 to 24.00
Axle turnings	10.50 to 11.00
Wrought turnings (free from cast)	10.00 to 10.50
Grate bars	10.00 to 10.50
Pipes and flues	12.50 to 13.00
Tank iron	12.00 to 12.50
Hoop and band iron	8.50 to 9.00
Sheet iron	7.50 to 8.00
Wrought drillings	10.00 to 10.50
Stove plate	10.50 to 11.00
Cast borings	7.50 to 8.00

CINCINNATI.

Market is Strong and Prices Show an Advancing Tendency.

August 20.

Pig Iron.—The market continues in strong position with an advancing tendency. There are now three periods of deliveries that present different aspects of the situation, namely, spot iron, last quarter delivery, and first quarter of next year. Spot iron is extremely scarce and No. 2 foundry has sold at $15.25 to $15.50, Birmingham, for prompt delivery, and some spot northern has brought as high as $18.50 f. o. b. southern Ohio furnace. Prices for delivery over the balance of this year are more difficult to quote owing to the limited number of furnaces that have this delivery to offer on the higher grades. Sales have been made during the week, however, at $14.50 and $15.00, Birmingham, for southern iron, and at $17.50 and $18.00 for southern Ohio, f. o. b. furnace. For the first half of next year, southern iron is obtainable at $14.50, Birmingham, and northern iron is selling at $17.50 for No. 2 at furnace. These may be regarded as minimum prices, as some of the makers are holding above these figures or are refusing to quote.

The largest inquiry in the market is from the Westinghouse Electric Co., which is asking for prices on 16,000 tons of southern iron for first half of next year. An Ohio manufacturer wants 1,500 tons of southern No. 3 and a like tonnage of northern No. 2 for August, September and October delivery. Among the sales of the week were 900 tons of northern and southern for last quarter delivery at $15.00, Birmingham, for the southern, and $18.00 furnace for the northern. In St. Louis territory Virginia basic brought $17.00 at furnace for a 4,000-ton order. There have been liberal sales of malleable iron for first quarter delivery at $17.50 at northern furnace. One melter took 6,500 tons, another 2,000 tons and another 600 tons on this basis.

While the market is not quotably higher than last week, the tendency of prices is upward and southern iron is hardening to a $15.00 basis. Northern iron is firm at $17.50 in the Ironton district and some makers are asking $18.00 and one furnace wants $18.50 for this year's delivery. We quote f. o. b. Cincinnati as follows:

Southern Foundry No. 1	$18.00 to 18.50
Southern Foundry No. 2	17.50 to 18.00
Southern Foundry No. 3	17.00 to 17.50
Southern Foundry No. 4	16.50 to 17.00
Southern Foundry No. 1, soft	18.00 to 18.50
Southern Foundry No. 2, soft	17.50 to 18.00
Gray Forge	15.75 to 16.25
Northern Foundry No. 1	19.15
Northern Foundry No. 2	18.65
Northern Foundry No. 3	18.15
Jackson County Silvery, 8 per cent	22.15
Southern Charcoal	24.00 to 25.00

Coke.—The market is firm and some contracts are being placed into next year on foundry coke. Scarcity of labor is interfering with deliveries. Prices in the leading coke producing districts are as follows:

Wise County, Va. Furnace Coke prompt shipment	$2.50 per ton
Wise County, Va. Foundry Coke on contracts	$3.00 to 3.25 per ton
Pocahontas Furnace Coke prompt shipment	$1.85 to 2.25 per ton
Pocahontas Foundry Coke on contracts	2.75 to 2.85 per ton
Connellsville Furnace Coke prompt shipment	2.50 to 2.85 per ton
Connellsville Foundry Coke on contracts	3.25 to 3.50 per ton
New River Foundry Coke on contracts	2.80 to 3.00 per ton
New River Furnace Coke, prompt shipment	2.25 to 2.50 per ton

†Wise County, Va., Coke on Furnace contracts is sold mainly on a sliding scale basis for pig iron prices on the following basis: $1.65 to $1.70 per ton on $9.00 pig iron, plus 17 percent of the advance on pig iron above $9.00 Birmingham.

Old Material.—The market is showing more life and some quotations are higher. There is an improved demand and the firmness in the pig iron market gives sellers more confidence. We quote:

Old No. 1 railroad wrought, net tons	$15.50 to 16.00
Cast machine and foundry, net tons	13.50 to 14.00
Old iron rails, gross tons	23.00 to 23.50
Old steel rails, gross tons	17.00 to 17.50
Old short lengths, gross tons	16.50 to 17.00
Old iron axles, net tons	22.50 to 23.50
Heavy melting scrap, gross ton	18.00 to 18.50
Stove plate, net tons	10.00 to 10.50
Wrought turnings, net tons	9.50 to 10.00
Cast borings, net tons	7.50 to 8.00
Car wheels, gross tons	17.00 to 18.00

Finished Material.—The market rules firm and deliveries on structural shapes are beginning to get more irregular and are now from eight to ten weeks in arrears. This has had a stimulating effect on the retail demand. The advance in bar iron is maintained.

We quote: bars at 1.73c, half extras, with dealers quoting 1.85c for iron and steel out of store. Galvanized sheets, No. 10 and No. 12, in car lots are 2.68c. We quote black sheets, No. 27 at 2.53c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.90c; No. 27, 2.70c; No. 16, 2.25c; No. 14, 2.15c; No. 12, 2.10c. Tank plates are firm and sell out of store at 2c to 2.10c for ¼-inch and 2.10c for 3-16, Nos. 8 and 10. Beams and channels are quoted at 2.25c to 2.35c from stock and angles at 2.10c to 2.15c for base sizes.

NEW YORK.

Excitement in Pig Iron Market Subsiding.—No Actual Scarcity Yet Except in Bessemer.

Office of THE IRON TRADE REVIEW, Room 1315, No. 150 NASSAU ST., Aug. 20.

Pig Iron.—Although conditions have not changed materially during the week, the fever has in a measure subsided. There has been more buying for distant future delivery and the trade is beginning to realize that some of the producers are merely holding off for better prices. In all grades except Bessemer the scarcity is only relative; in Bessemer it is actual and apparently unmitigated. Basic is not actually scarce, but has been very heavily sold and sellers are afraid to approach too near their full capacity. The higher grades of foundry are rather scarce, but in the lower grades this condition is not reflected in the current of trade.

Prices have not advanced materially during the week, although the tendency is toward greater strength and enhanced values. In basic an isolated lot of 1,000 tons has been sold at $18, furnace, but in view of the fact that the total sales during the last few weeks have been nearly a quarter million tons, the variation in price—only about 50 cents a ton—is remarkably small. Southern producers are holding Alabama No. 2 at $15 and No. 3 at $14.50, Birmingham. One furnace in the district has instructed its agents to demand $16 for No. 2, but apparently with no great desire to do business.

The total sales for the week in the local market amount in round numbers to about 25,000 tons basic, 50,000 tons of foundry grades and between 4,000 and 5,000 tons of gray forge. Of this total about one-half is to be delivered in the early part of 1907. Some premiums have been demanded and secured for early delivery for favorite brands to belated buyers, but as a rule the larger producers are conservative and are doing their best to maintain prices at a steady, reasonably profitable level.

Coke is rather scarce. Sales have not been heavy and prices remain about the same. Ferro-manganese is comparatively quiet.

The following are prices of pig iron at tidewater.

Northern No. 1 Foundry	$19.25 to 19.75
No. 2 Foundry	18.75 to 19.25
No. 2 Plain	18.25 to 18.75
No. 1 Southern Foundry	19.00 to 19.50
No. 2 Southern Foundry	18.50 to 19.00
No. 3 Southern Foundry	18.00 to 18.50
No. 4 Foundry	17.50 to 18.00

Certificates and Standard Contracts.—Trading has been more active especially in standard foundry contracts. There were a number of sales in 100-ton lots amounting in all to about 1,200 tons the price being $18 and $18.25. Deliveries were mostly for November and October. The following are today's asked and bid prices for standard foundry iron contracts.

Standard Foundry Contracts.

	Bid.	Asked.
August	18.25	....
September	18.10	19.00
October	18.00	18.20
November	17.90	18.00
December	17.90	18.00

Finished Iron and Steel.—The tonnage represented in the week's transactions in structural steel and rails is not large, but specifications on old contracts were of sufficient volume to satisfy the mills. Thus far the total rail contracts do not amount to more than 30,000 tons, but several large quantities are under negotiation. The New Jersey Central and the Philadelphia & Reading placed supplementary orders amounting to about 10,000. Other contracts are the following: Great Falls & Old Dominion, 1,500 tons; Northern Indiana, 2,100 tons; Chicago & Indiana Southern, 5,000 tons, and the Northern Pacific, an additional order for 10,000 tons. In the structural field there are a number of additional contracts in prospect, but like the larger projects frequently mentioned, they are slow in materializing. Among one of the more interesting, although the tonnage of steel required will not be large, is a proposed enlargement of the Waldorf-Astoria hotel. The contracts placed during the week were all relatively small. The Kesner building in Chicago will take 900 tons, the Chapel Court building in this city, 900 tons, and bridge work on the Atlantic Coast Line 300 tons. Business in steel plates has been of the routine variety, but of satisfactory volume. Bar iron is active and prices are a shade higher in spite of the fact that the Bar Iron Association at its monthly meeting during the past week in the Waldorf-Astoria hotel reaffirmed the old price of 1.50c base, Pittsburg. No material is now to be had at that figure, prices ranging from 1.55c to 1.60c. The sheet trade is anticipating increased demand by reason of the large number of steel cars which are to be built, several roads having decided to place orders for many thousands for passenger as well as freight service in the near future.

The following are prices at tidewater: Angles, 3 to 6 inches x ¼-inch and heavier, 1.84½c; beams, 3 to 15 inches, 1.84½c; tees, 3 x ¼ inch and heavier, 1.89½c; plates, carloads, tank, 1.74½c; refined, 1.84½c; marine boiler, 2.41½c; refined iron bars, 1.69½c to 1.74½c; soft steel bars, 1.64½c; sheets, No. 28 black, 2.50c.

Old Materials.—The market for all classes of scrap except rolling mill stock has been fairly active during the week. Orders from consumers were, however, few, transactions being confined largely to brokers who expect enhanced values in sympathy with other lines of materials. Local sales included 1,500 tons of heavy melting steel scrap and 500 tons of cast scrap. Old cast iron car wheels are scarce. Prices are stronger and for this reason buyers are reluctant. The scarcity of pig iron is the cause of the market's strength. The following are prices approximately, f. o. b. tidewater.

Old iron rails	$20.00 to 21.00
Old steel rails, long lengths	15.00 to 15.50
Old steel rails, short pieces	14.50 to 15.00
Relaying rails	25.00 to 26.00
Old car wheels	16.50 to 17.00
Old iron car axles	25.00 to 26.00
Old steel car axles	18.00 to 19.00
Heavy melting steel scrap	14.50 to 15.00
No. 1 railroad wrought scrap	16.00 to 16.50
Iron track scrap	14.50 to 15.00
Wrought pipe	12.50 to 13.50
Cast borings	9.00 to 9.50
Wrought turnings	11.50 to 12.00

ST. LOUIS.

Market Active and Higher Prices of Pig Iron Are Predicted.

August 20.

Pig Iron.—There is every indication of a runaway iron market. For the last five weeks there has been a steady climb in prices, and today agents and furnace men are predicting $17 and $18 iron before the end of the year. Fifteen dollars Birmingham, for No. 2 is the market, but no spot iron can be bought at this figure. A premium of 50 cents to $1.00 is being paid for delivery within sixty days.

Some little iron has been sold for the first quarter for $15, but furnaces are not showing any desire to book orders at that figure. It is not alone due to the scarcity of the metal. Iron makers who loaded up their books when the market was down around $12.50 and $13.00, are determined not to get caught again, and will wait until they have a more definite line on the situation. One southern furnace has just written its St. Louis agent canceling its quotations for the first quarter, declaring that it will hold off the market for a while. A Virginia furnace which gave another St. Louis agent bookings for January, February and March, has notified the agent not to sell. Afraid that deliveries will not be made on schedule, many melters are accepting No. 3 and No. 4 on contracts calling for No. 2 straight.

Several sales are recorded for the last week, the best being 12,000 tons of basic bought by Scullin & Gallagher. The order was divided among three houses. Three hundred tons of No. 2 for delivery during the next five months brought $15.00, while two lots of six carloads each for November and December sold for $15.50. One hundred tons sold for $15.00 for the same period. Some carload lots sold as high as $16.00.

Iron quotations, including the freight rate of $3.50 Birmingham, to East St. Louis, range as follows:

Southern No. 1	$19.00 to 19.50
Southern No. 2	18.50 to 19.00
Southern No. 3	18.00 to 18.50
Southern No. 4	17.50 to 18.00
Gray Forge	17.25 to 17.75

Coke.—Buying of coke for the winter's consumption has set in, and some large tonnages are reported. One house booked 800 tons last week and several did nearly as well. One agent sold 1,000 tons of smithing coal. Coke prices range from $5.85 to $6.30.

Finished Material.—As fall approaches local mills and foundries are running further and further behind on their orders. There is a hitch in the letting of contracts for the new Butler Brothers building. It is now announced that reinforced concrete may be used instead of steel. The building would require about 4,500 tons of steel.

BIRMINGHAM.

Iron Selling on Basis of $15 and Heavy Inquiries Are Pending.

August 20.

No. 2 foundry pig iron, $15 per ton, the demand good, an inquiry that will take a large quantity of the product to fill and prospects of a steady demand for some time to come. That is the picture of the southern pig iron mart. The furnace companies are not in a position to go into the market without considering every step taken. The probable make is not as extensive as it might be. The demand shows no signs of easing up in the near future. There is not much talk now being indulged in as to a runaway market. The $15 price appears to be almost the top notch, though in some quarters it is reported that a still better price will be noted before the middle of September.

J. W. McQueen, vice president of the Sloss-Sheffield Steel & Iron Co., in answer to a question as to his company being out of the mart, replied that it was still receiving orders, though he intimated that a very great amount of iron could not be secured in this section. He stated that the prices for the product would continue strong through the balance of the year.

The Tennessee Coal, Iron & Railroad

Co. has completed rebuilding its No. 5 furnace at Ensley and the torch has been applied. It is expected that this furnace will be producing iron steadily before the end of the week. The most improved machinery has been used in rebuilding this furnace, labor-saving devices being added both on the bottom and top of the furnace. It is expected that this new furnace will do as well as has No. 6. The latter has the record in this district for output, a daily production of some four hundred tons being noted. Basic iron will be manufactured at the new furnace. It is generally understood that the Tennessee company intends rebuilding the other four furnaces, one by one, so that by the time the new steel plant is completed there will be enough blast iron furnaces in shape, together with those at Thomas (Republic company), just a mile or two from Ensley, to furnish all the basic iron that will be needed.

Work will be started on the new furnace to be erected by the Birmingham Iron Co. (formerly the Tutweiler company) at Boyles, a few miles north of the city. The contracts for the iron maker, it is given out on good authority, have all been let and the actual construction work will be pushed when once started.

The union coal miners' strike, which has been on at furnace company mines in this state for more than two years, will probably be declared officially off this week. The miners lose their fight. The furnace companies maintain their refusal to recognize the union.

Metal Market

NEW YORK.

August 20.

Pig Tin.—Spot tin is firmly held, but futures are easy. Trading has been confined to rather narrow limits. The following are today's quotations: Spot, 41.30 to 41.62½; August, 40.25 to 40.50; September, 40 to 40.20. London, £182 15s and £183 2s 6d. Arrivals for the month to date, 1,711 tons; afloat, 2,241.

Copper.—Domestic consumers bought moderately and prices rule firm. Today's quotations: Lake, 18¼; electrolytic, 18½; casting, 18¼. London, £84 15s and £84 15s. Exports for the month to date, 9,432.

Lead.—There was only a fair demand and the market has been quiet. Today's closings, 5.75; St. Louis, 5.65; London, £17 2s 6d.

Spelter.—The demand has been only moderate and the market is quiet. Today's quotations: 6.00 to 6.10; St. Louis, 5.90; London, £27.

Aluminum.—After the recent advance of 1 cent, prices have remained unchanged. No. 1 ingots, 99 per cent pure, are offered at 36 cents, and No. 2, over 90 per cent pure, at 34 cents.

ST. LOUIS.

August 20.

Today lead is steady at $5.65 and $5.67½. One hundred tons of Missouri brand sold for $5.65 Friday, but a like bid has since been declined. Spelter is steady at $5.92½ with $5.90 bid. No sales reported.

DECREASED SHIPMENTS

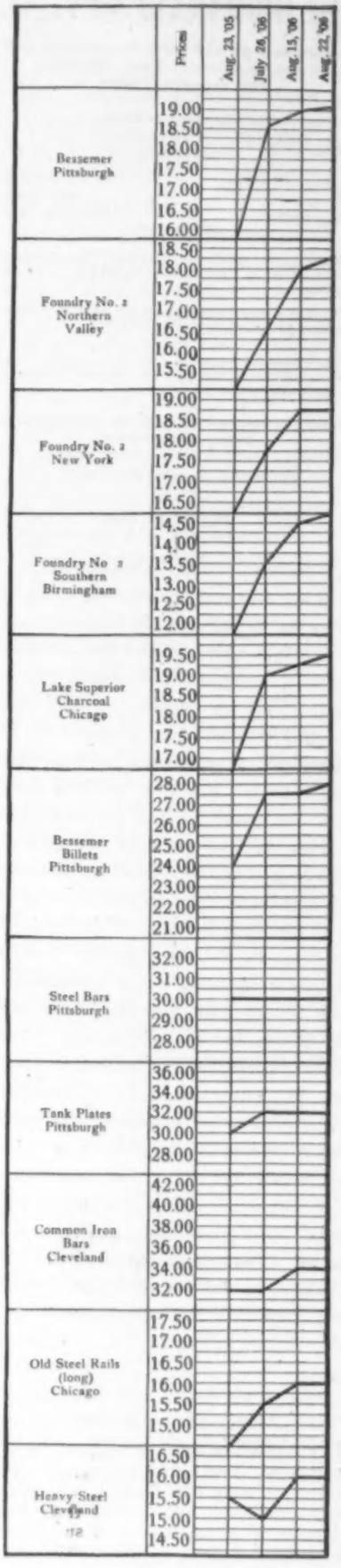
Due to Bridge Accident, but Two Harbors Made a Good Showing.

Duluth, Aug. 20, 1906.—The figures for the week ending August 14 show that the bridge accident at Duluth decreased the shipments of the Missabe ore docks by at least 100,000 tons. This was in part made up, however, by Two Harbors, where they handled almost 70,000 tons more during that period than the weekly average on those docks for the season. The confusion at the Missabe docks was much less than anticipated and the ordinary routine is now entirely resumed. The shipment figures for the seven days, August 7 to August 14, are as follows: Two Harbors, 310,582 tons; Duluth, 244,037 tons, and Superior, 218,648 tons, an aggregate of 773,267 tons. The same figures for 1905 are: Two Harbors, 288,044 tons; Duluth, 344,608 tons, and Superior, 173,665 tons, totaling 806,317 tons, which indicates a decrease for the week in 1906, as compared with the corresponding week in 1905, of 33,050 tons. The season total to the 14th has been 13,086,867 tons as against 12,717,007 tons last year.

During the delay all of the steam shovels in the mines shipping over the Missabe road were shut down, but the underground properties were kept in operation. About 200 pockets of the new No. 4 Missabe dock will be ready for use shortly after the first of September and the entire dock will be in active service before navigation closes. It may be conservatively predicted that with all four docks working a half million tons will be easily shipped from Duluth every week.

Steel Cars in Canada.—The first steel car ever manufactured in Canada has been turned out by the Dominion Steel Car Co., of Montreal, which some time since received an order from the Canadian Pacific railway for 500 all-round steel, 100,000-pound capacity drop bottom gondolas. The order is being filled, and has since been supplemented by another for fifty 100,000-pound capacity steel ore cars but of a somewhat different type.

PRICE CHART.



THE IRON TRADE REVIEW

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August 23, 1906

GRAND OLD UNCLE JOE.

When the presidential bee begins to buzz in a statesman's bonnet, one generally expects to find that all evidence of courage will disappear. William Jennings Bryan recently remarked that he did not desire to be considered a presidential candidate because he did not want to keep quiet and "be good" during the next two years. In contrast with the proverbial lack of positive views on the part of candidates, it is, indeed, pleasing to read the speech delivered on Aug. 18, at Danville, Ill., by Speaker Cannon to the convention which renominated him for congress and proclaimed him its choice for the presidency. The leading feature of Mr. Cannon's speech was his denunciations of the unreasonable attitude of Gompers and other labor leaders in advocating the bill commonly known as the anti-injunction bill, which is really a bill to provoke lawlessness and promote anarchy. The grand old man did not hesitate, he did not equivocate, he did not straddle. He talked plainly and this is the principal part of what he said:

"There has been much criticism and much denunciation against alleged 'government by injunction,' and violent attacks have been made upon the judiciary of the United States. Mr. Gompers, with Mr. Spelling, his attorney, advocated and secured the introduction of a bill, which, in substance, prohibited United States courts from issuing injunctions in any case between employer and employe unless necessary to prevent irreparable injury to property or to a property right of the party making the application, for which injury there is no adequate remedy at law, and in the next sentence provided, 'and for the purposes of this act no right to carry on business of any particular kind or at any particular place, or at all, shall be construed, held, considered, or treated as property or as constituting a property right.'

"Mr. Gompers claims that in contests growing out of strikes or lockouts he is opposed to violence on the part of any one connected with the controversy. I will not question the good faith of the claim, but I do say that if the legislation he demands were enacted destruction of property by irresponsible persons in such controversies would increase. The legislation that Mr. Gompers demands would turn loose in times of trouble the criminally disposed. In charity for him, I do not believe that he realizes the consequences that would result from that which he advocates, and, in justice to all the citizenship of the republic, in justice to every man who lives in the sweat of his face by honest endeavor, I am now, and will be at all times, opposed to the legislation which he demands."

The country was very much in need of just such a bold and manly declaration as has come from the distinguished congressman from Illinois. In spite of the fact that it seems a dangerous policy for anyone to antagonize labor leaders, this speech may make Cannon the next president of the United States. It displays the same splendid courage which first brought Grover Cleveland into prominence and which, more than anything else, insures him such fame as will be accorded him by American historians. It is like the bravery of a Roosevelt which has made the present occupant of the white house the most popular president since Lincoln. No one dare say that Uncle Joe Cannon's heart does not beat in sympathy with that of the common people and he sees that no one would ultimately suffer more than the workingmen by the inauguration of a realm of lawlessness such as would be possible under the Gompers bill. Speaker Cannon's bold defiance of the unions and his stand for the right come most opportunely and will give courage to many a timid leader. It means that the effort of Gompers and his associates to dictate the political policies of this republic will be met fairly and squarely, and we do not doubt what will be the result of the contest so conducted. The party or the candidate truckling to lawlessness and anarchy will surely be defeated.

EARLY IRON SALES FOR NEXT YEAR.

With the purchase during the past fortnight of 100,000 tons of Bessemer for delivery during the first five or six months of 1907 and of other considerable tonnages in the Chicago, Philadelphia and Cleveland districts for first quarter shipment, the actual buying movement for 1907 requirements may be said to have been launched. The opening is thus unusually early, though by no means setting a new record, as twice in the past decade active buying has preceded that date. The approximate time of the first representative sales for the next season, together with the valley prices of Bessemer and foundry iron at the beginning of the movement, is tabulated below:

Year.	Buying Begun.	Bess. Price.	Foundry Price.
1897	Sept. 15	$ 9.50	$ 9.25
1898	Oct. 1	10.00	9.75
1899	July 1	20.00	18.50
1900	Sept. 15	13.50	14.00
1901	Sept. 1	15.25	13.75
1902	May 20	21.00	21.00
1903	Nov. 1	14.75	14.25
1904	Sept. 20	11.75	12.00
1905	Sept. 15	15.35	14.50
1906	Aug. 1	17.75	17.50

From an analysis of the above it will appear that the earliest buying movements were in years when the price of iron was abnormally high, and that as prevailing prices happened to be lower or higher the opening of the season was delayed or advanced. The year in which buying begun in May, the record-breaking 1902, consumers paid $21.00 for their iron at the opening of the movement: one year saw July buying at $18.50 for foundry and $20.00 for Bessemer, and the present year, the third earliest of the decade, opened with iron at about $17.75 valley. In half of the ten years, buying was begun in September, with the average price of Bessemer slightly over $13.00 and of foundry about $12.75. One year when the price was hovering about the ten-dollar mark, little iron was closed for until in October. The latest buying move-

ment was in November, 1903, when the opening price was in the neighborhood of $14.50. In this instance the delay is reconciled with the relatively high price by the fact that all through the year there had been a steady decline from the extremely high figures of 1902, and buying was postponed as long as furnaces felt safe in waiting. Only small tonnages were taken, however, and consumers profited largely by the still lower prices which followed.

It is not to be wondered at that high iron prices and early buying movements hold together to such a striking degree: in fact, it would be more remarkable if they did not, for it is the demand in relation to production which establishes the price and largely the same factors, coupled with the price itself, dictate the time of buying. With conditions as they are, the case of the present year is about what was to be expected and is no exception to the experience of the past.

DOES DISCONTENT PAY?

Every sensible employer is anxious to keep his best men, and the more intelligent and enterprising American workman is all too ready to seek better prospects in another field. That frequent changes are in the long run profitable to no one is usually admitted by both employe and employer, but in this country of alluring possibilities the chance of doing better elsewhere is a constant and irresistible attraction. The fixed boulder attracts a fine growth of moss, but the rolling stone takes on a polish and has a chance, albeit a slim one, of adorning an office desk in the role of a paperweight. It is this chance together with ambition that drives men to desert good situations for others of unknown qualities.

Profit-sharing plans, as a means of keeping the more desirable workmen, have usually failed because they have contained no provision for satisfying the almost universal desire to take a chance. The returns are too small and too slow in coming to allay the natural discontent with present conditions. In working out the system of stock ownership among employes the officers of the United States Steel Corporation evidently had this trait of human nature in mind.

The share holding plan was put into operation in 1902 and seems to be very popular among the employes. The corporation offers a limited number of shares of preferred stock to a group of workmen each year at something less than the market price. The corporation also guarantees to every purchaser of such stock a bonus of five dollars per share per year for five years, provided that he does not leave during that period. There is also a provision for distributing the bonus forfeited by a departing worker among the remaining members of the group. The bonus of $25 soon to mature on the first purchases of stock reduces the original cost to $57.50, not much more than half its present market value.

As a business proposal the offer seems attractive enough, and there are at present 20,000 skilled workmen who are also shareholders. But it has not entirely subdued the roving disposition of the discontented. Reports state that members of the first group will at the conclusion of the five years receive, in addition to their own bonus of $25, the sum of $21.50 as the portion of those who have thought so little of their chances as to desert them.

This shows among other things that nearly one-half the workmen who four years ago accepted a business offer, the advantages of which all seemed to point in one direction, have forfeited their right to share in the distribution. Truly, there is no danger of our workmen falling into the plodding content of the European employe. If discontent is ambition, and if it is ambition that makes a people great, it is no wonder that we have grown to be the mightiest nation on earth. Perhaps, however, we have become great in spite of being discontented.

PROSPECTIVE PIG IRON PRODUCTION.

James M. Swank has lately given some notes on blast furnaces completed since the first of the year, and now being built. These notes appear to be very complete and it is possible with them to make some estimates of our future blast furnace capacity.

It has been the impression in the trade that no large additions to our blast furnace capacity have been under way, and this is true in a relative sense. The new erection is on a much smaller scale than that which permitted the increase from 18,000,000 tons in 1903 to 23,000,000 tons in 1905, or 28 per cent, but still it is quite large.

Mr. Swank recently noted the completion during the first half of this year of blast furnaces having a rated capacity of 880,000 gross tons per year. Computing from the dates at which they blew in, they should have contributed to the first half production 198,170 gross tons, if they made their rating. Probably they did not come up to this. The reported production in the first half was 12,602,901 gross tons, but the calendar half year is a day and a half short, so that the real half year would have shown about 12,700,000 gross tons, and counting out the make of the new furnaces leaves about 12,500,000 tons as the make during the actual half year of furnaces completed prior to Jan. 1. It is safe to assume that on Jan. 1, 1906, the furnaces of the United States were actually able to make 25,000,000 tons of pig iron a year, allowing for accidents, relining, etc., since that is about what they have really been doing. With this as a basis, one can separate the blast furnaces reported by Mr. Swank into half years as to the dates of their completion or prospective completion, and construct the following table:

Annual Rated Capacity of New Blast Furnaces:

Completion.	Capacity.
First half, 1906, 7 furnaces	880,000
Second half, 1906, 9 furnaces...	975,000
First half, 1907, 5 furnaces....	818,000
Later, 6 furnaces	869,000

It is well understood that furnaces do not usually work up to their rated capacities. In their early life there are various irregularities, the first lining may not last as long as subsequent linings, and in later life relining cuts out some production at more or less regular intervals. A deduction of about 10 per cent would probably be fair, and on this basis the actual presumptive output of the country's

blast furnaces may be set down as follows on the basis of as satisfactory a market as has lately existed and promises to continue for many months:

	Actual capacity.
Jan. 1, 1906	25,000,000
July 1, 1906	25,792,000
Jan. 1, 1907	26,670,000
July 1, 1907	27,400,000
Jan. 1, 1908	28,180,000

Usually it is desirable to make some allowance for furnaces not being completed as soon as expected. For the immediate future such allowance is hardly necessary. Those who are having blast furnaces built know about what conditions are in the shops making their apparatus, and will certainly make every effort to have the work rushed to completion. The six furnaces which are not expected to be completed until after the first half of next year are the four furnaces at Gary, one South Bethlehem and one Minnequa.

A rough idea of what our pig iron production should be in the event of these furnaces being completed as scheduled and of the present furnaces working as well as heretofore is computed by estimating the output of each new furnace at 80 per cent of its rating to the end of the half year in which it is blown in, and at 90 per cent thereafter. Still dividing the year into exact rather than calendar halves, output should be as follows.

First half, 1906	12,700,000
Second half, 1906	13,050,000
Year, 1906	25,750,000
First half, 1907	13,500,000
Second half, 1907	13,750,000
Year, 1907	27,250,000
Year, 1908	28,180,000

This would make the year 1908 show an increase over the actual production in 1905 of less than 23 per cent. In the three years from 1902 to 1905 the increase was 29 per cent. The increase from 1905 to 1907 would be 18 per cent, while the increase from 1903 to 1905 was 28 per cent.

The evidences clearly are therefore that the blast furnaces now being built will not increase pig iron capacity at the rate which the market has heretofore stood, and stood extremely well, considering the almost famine conditions which prevail at the present time. What the iron trade needs to concern itself with is rather whether the market will stand anything like the previous rate of increase. The time will come, sooner or later, as it always does, when the creation of new capacity will have overreached conditions. That time will probably come rather through a decrease in demand than through an undue increase in capacity. The latter will be only a contributory cause.

HART TO HEAD INLAND STEEL COMPANY.

Charles Hart, vice president and general manager of the northern division of the Republic Iron & Steel Co., Youngstown, O., has tendered his resignation to take effect some time during September. He will become connected with the Inland Steel Co., and, when the reorganization now going on is completed, he will be made president. The Inland Steel Co. is one of the largest steel-making concerns in the middle west. It is understood that A. W. Thompson, former president of the Republic, is to be a director and heavy stockholder.

The rise of Mr. Hart in the steel business since he was located in Youngstown in 1889 as assistant to Charles Rader, who was in charge of the blast furnace department, has been rapid. He had graduated from Lafayette college and had been for a time with the Carnegie Steel Co. He soon succeeded Mr. Rader and later when the Bessemer plant was added to the Brown-Bonnell works this department also came under his management. This is where his steel experience with the Carnegie company served him well. In 1904 all of the district mills and furnaces were placed under his control and in October last he was made general manager of all the northern mills and second vice president.

With the resignation of Mr. Hart, the position he has held will be abolished and Mr. T. J. Bray, now assistant to President Topping, and in charge of the engineering department, will become vice president, and T. R. Aiken, now assistant general manager, will become general superintendent in charge of the operating department.

In connection with the fourth International Colliery exhibition, to be in Great Britain in 1908, it is planned to hold also an international mining conference. Arrangements are in charge of the secretary, 30-31 Furnival street, Holborn, London, E. C.

BOILER MAKERS TO HOLD CONVENTION.

The eighteenth annual convention of the American Boiler Manufacturers' Association of the United States and Canada will be held at the Hotel Schenley, Pittsburg, Sept. 18, 19 and 20. Arrangements have been completed by the secretary, J. D. Farasey, Cleveland, O., and by a local committee consisting of George N. Riley, Robert Monroe Jr., James Lappan and Capt. Thomas Rees. An elaborate program with a number of social functions has been planned.

On the opening day the association will be welcomed by Mayor Guthrie and by H. P. Bope, first vice president of the Carnegie Steel Co., response being made by E. D. Meier, president of the Heine Safety Boiler Co., of New York. The president's address and other business will complete the morning and the afternoon and evening will be given over to a steamboat trip on the Monongahela, passing a number of the largest manufacturing plants of the district, luncheon on board, and returning in time to witness the wonderful sight of the great plants in operation after dark. The morning of the following day will be given up to business, an automobile outing being arranged for the ladies with luncheon at the Pittsburg Club, and in the evening the entire convention party will visit Luna Park. The party will also make the "belt line" trip around the city the following morning, lunching at the plant of the Heinz Pickle Co., which will be inspected. The convention will close with a banquet at the Schenley in the evening. John Dazell, James Francis Burke and others will speak and a number of vaudeville features will be given.

RECORD PULLMAN EARNINGS.

Record earnings are shown by the report of operations of the Pullman Co. for the year ending with July 31, 1906. After charging off for depreciation and betterments in the late fiscal year to a greater degree than ever before there was remaining a surplus applicable to dividends of about $13,000,000, the equivalent of 17½ per cent earned on the company's $74,000,000 capitalization. This compares with the equivalent of 13.4 per cent in 1905, 12.9 per cent in 1904, and 12.7 per cent in 1903. The report, when issued, will show a liquid surplus of $23,000,000, equal to about 31 per cent on the capital stock.

ADVANCE GRANTED

To Molders in New York District.—Other Labor Notes.

With the exception of one large foundry on Long Island Sound all the shops of the New York district are now at peace with their workmen. The foundrymen at Elizabeth, N. J., last week reached an agreement which is to go into effect Oct. 1, molders receiving $3.25 and coremakers $3.00 per day. According to a statement of the officers of the iron molders' conference board, 1,500 molders of Manhattan and Brooklyn have gained an advance of 25 cents a day on the minimum wage rate to continue for one year. The minimum rate is now $3.25 a day. A proportionate advance has been granted to 700 men in Newark, 300 in Elizabeth and 150 in Plainfield, N. J.

The single important firm still at odds with the molders' union is asking employes to sign the following agreement:

"The party of the first part hereby agrees to work for said ..... party of the second part, as a pattern molder continuously until such time as he is notified that his services are no longer desired by the party of the second part, for the remuneration of $3.60 per day of ten hours.

"The party of the first part agrees that at all times the party of the second part shall retain a certain amount of his wages, so that the party of the second part shall always have within their keeping at least one full week's wages of the party of the first part. And if the party of the first part leaves the employ of the party of the second part without two weeks' previous notice, or in case he becomes affiliated with any movement which in the judgment of the party of the second part is detrimental to them on the part of their shop employes, or in case the party of the first part in any manner fai's to give satisfaction to the party of the second part, then whatever moneys may be due the party of the first part from the party of the second part at that time, shall be retained by the party of the second part, and the sum so retained by the party of the second part to be considered as damages."

Youngstown Settlement.

A settlement was reached Saturday afternoon in the special wage scale for the roll hands of the 18-inch continuous mill at the Brown-Bonnell plant, Youngstown, O. Straight bar mill prices for rolling will prevail, with the exception of skelp iron on which order a slight concession was granted by the district board of the Amalgamated association. The mill, which had been idle since July 1, resumed operation Monday morning. The association was represented on the conference by President McArdle, Ben Jones, vice president of the finishers' division, and five employes of the mills. Charles Hart, J. R. Deetrick and Harry Parrock, the latter superintendent of the mills, represented the Republic.

Labor Notes.

A recent attempt was made to wreck a new $100,000 iron mill of the Longmead Iron Co., at Conshohocken, Pa., now in course of erection. The watchman was overpowered and kept a prisoner for some time while the wreckers fired the boiler room. The claim is made that the attack was made at contractors who are operating under the open shop plan.

As a result of a clash between union and non-union men of the Creighton mines of the Pittsburg Plate Glass Co., Pittsburg, recently, one man is dead and another suffering from serious injuries. The dead man, who was keeper of a non-union men's boarding house, was stabbed in the back.

According to press reports, Chicago labor men are planning to declare war on the new steel town now building at Gary, Ind. Gary is out of the jurisdiction of Chicago unions, but it is intimated that the locals at Hammond, Ind., will take action on the charges that many non-union men are employed on construction work and that union men working there are not receiving the full scale.

General strikes were recently declared at the plants of the Portsmouth Stove & Range Co., Portsmouth, and the Ohio Stove Co. A recent attempt was made to unionize these plants.

Fifty members of the Iron Molders' union, employed at the iron foundry of the American Iron & Foundry Co., Terre Haute, Ind., struck Aug. 15, refusing to work with foreign and negro laborers.

Large Increase in Earnings.—The *Financial Chronicle* says: "Our July compilation of the gross earnings of United States railroads is of the same highly favorable character as the exhibits for the months immediately preceding. Of course the statement is only preliminary, covering merely the roads which furnish early returns. These comprise altogether an aggregate of 96,484 miles of line (not quite half the mileage of the country), and on this mileage the improvement in gross revenues as compared with the corresponding month last year reaches the large sum of $10,392,107, equivalent to 14.60 per cent. This is the best ratio of gain shown in any monthly exhibit of ours since the phenomenally favorable statements for January and February, when the mild winter weather combined with other causes to swell the increase to exceptional proportions. The present increase, it is needless to say, follows an increase last year in the same month. As a matter of fact the July results have been continuously favorable for over a decade past, excepting only in 1904, when there was a small falling off.

AUSTRALIA RAISES ITS FARM TOOL TARIFF.

(Special Correspondence.)

Toronto, Can., Aug. 20.—D. H. Ross, Canadian commercial agent at Melbourne, Australia, has advised the Trade and Commerce Department that the Australian government has raised the duties on agricultural implements to 15 and 25 per cent. Presumably the 15 per cent rate applies to the machinery hitherto admitted duty free, and the higher rate to implements lately subject to a duty of 12½ per cent. The new duties will be a serious drawback to the growing trade in farm implements with Australia, the shipments of which from Canada last year amounted to about $700,000.

The International Harvester Co., of Hamilton, Ont., temporarily reduced its working force last week for stock taking. When operations are resumed in the course of a few days it will be on a larger scale than ever. The number of hands will be increased to 2,000, which is 200 more than the largest staff hitherto employed. The company has a large amount of orders ahead, and is undertaking some new lines of goods.

The Canadian Bridge Co., of Walkerville, Ont., has secured the contract let by the Provincial government of Saskatchewan for the construction of the steel superstructure of the traffic bridge over the Saskatchewan river at Saskatoon. The contract price is slightly over $64,000, which, added to the cost of the concrete sub-structure, will make the total cost about $105,000.

New Shenango Furnace.—The new furnace of the Shenango Furnace Co., now being rushed to completion at Sharpsville, Pa., will have a capacity of approximately 400 tons daily. Contracts have been closed with the Allis-Chalmers Co. for three engines, with an option on three others for a second furnace which is contemplated, and with McClure & Co. of Pittsburg for four 21 x 85-foot stoves. Boilers and other materials as needed are being contracted for. It is hoped to have the furnace in operation some time during the first half of 1907.

The Reading Steel Casting Co., recently incorporated, has acquired the property formerly occupied by the Brylgon Steel Casting Co., at Reading, Pa., and is especially equipped for the production of small, intricate steel castings by the Tropenas process. The company now has about 100 men in its employ, and is producing about 150 tons of steel castings a month.

IMPORTANT DISCUSSIONS

At the Meeting of the British Foundrymens' Association.

(Special Correspondence.)

Middlesbrough, Eng., Aug. 9.—The third annual convention of the British Foundrymen's Association was held at the lecture hall of the Middlesbrough High School, Middlesbrough, England, beginning on Tuesday, August 7. There was a large attendance and all present seemed much interested in the subjects discussed. Mr. Robert Buchanan, of Walsall, last year's president, occupied the chair at the beginning of the meeting.

The secretary's annual report was of considerable interest, showing, among other things, that the first year the membership was 89, the second 121, and the present 180. The finances were also in a very satisfactory condition, with a substantial balance in the treasury. Since the last convention, three local branches had been formed, one in Manchester, one in Birmingham and one in Cardiff, and all the branches were in a flourishing condition.

Mr. Herbert Pilkington, the new president, was then presented and thanked the membership for his election. Mr. Cook, of Birmingham, was elected vice president and Mr. F. W. Finch re-elected as secretary and treasurer.

The mayor of Middlesbrough welcomed the members to Middlesbrough.

The president's address was one of the most interesting papers presented at the meeting, viewing, as he did, many points of great interest to British foundrymen.

Mr. P. Munnoch, of Middlesbrough, next read his paper on "The Grading of Iron for the Foundry." This paper was very extensively discussed. The writer advocates a grading system, based upon the sulphur content and also upon the fracture. In other words, the grading system would be between grading by fracture and grading by analysis. The various foundrymen in discussing the paper expressed different opinions, but it is evident that those who were most familiar with grading by analysis favored it, or rather at least favored making their mixtures by analysis.

Contraction and Shrinkage.

The proceedings were continued Wednesday in the lecture hall of the Middlesbrough High School when a number of additional members and visitors were present.

The first paper read was that of "Shrinkage from a Founder's Point of View," by W. Roxburg, of Kilmarnock. After some preliminary remarks upon shrinkage in general, the writer considered shrinkage in castings, and gave considerable valuable information upon the subject, but as must of necessity be the case in the present state of the foundrymen's art, there were many questions presented for which solutions are still lacking.

The reading of the paper was followed by an extensive discussion upon the subject, in which a number of members took part. The discussion contains much of practical value. Mr. Mason called attention to the fact that West, in his writings, made a distinction between contraction and shrinkage, the term shrinkage being applied to those holes with which all foundrymen were troubled, while contraction was the reduction from the size of the pattern to the size of the casting when cold. He then narrated a number of experiences which he had in regard to shrinkage of different metals. He also stated that irons melted two or three times over did not give as much trouble from shrinkage as iron melted fresh from the pig, and also when scrap was low and more pig iron had to be used, the trouble from shrinkage holes increased. Prof. Turner had expressed the opinion that the shrinkage was mostly due to what was called eutectic, that is, metal below the freezing point separating from other parts of the alloy or metal. For instance, the graphite would freeze first, in which case the iron would form the eutectic. He also told of an experience in casting plates 5-16-inch thick, two feet wide and three feet long. The patterns for these plates were always cambered, but even then some difficulty was found in producing straight castings. For producing these plates, practice would finally resolve itself somewhat as follows: The plates are cast and then after from 12 to 17 minutes, the flasks are turned on edge and the center of the plates stripped, exposing about one square foot. The color of these is watched, and as it turns to a dark red, more of the plates are stripped. In this way, the center shrinks first, and comparatively little trouble is experienced with warped plates.

Prof. Turner then stated that all were met at once by the difficulty of the definitions of shrinkage and contraction. He thought, however, that, though there was a great deal of difference between American writers, the difference of opinion were less than differences of definition. Personally, he had adopted, as far as possible, Keep's definition, which he illustrated by stating that if a piece of iron be heated and cooled again, it would expand and then contract to its original size; but, if a piece of damp clay be dried, it would be found that it had contracted. If the clay be baked, it would contract still further, and would not recover its original size on being moistened. He called this last contraction shrinkage, but noted the fact that the writer had laid down the rule that metal shrinks according to its density, and that platinum or gold, though very dense metals, did not shrink abnormally, neither did lead. He then stated that metals shrank as a rule according to their melting point, and the higher the melting point, the greater the fall of temperature; therefore, the greater the contraction. For this reason, steel would shrink more than cast iron, and cast iron would shrink more than the majority of other metals. Also, shrinkage depends upon the size of the castings.

Mr. F. J. Cook, of Birmingham, discussed the paper, stating among other things, that many facts must be taken into consideration for the complete solution of the problem, but, that in a general way, by following Keep's rules, good results were produced. There are all sorts of complaints against draftsmen for designing castings of varying thicknesses, but the speaker had a fellow feeling for the draftsmen, because he was a draftsman as well as a foundryman, and the proper solution for many such castings was to be found in the proper method of cooling. It was his experience that castings ought to be taken from the molds as soon as possible.

Mr. Percy Longmuir stated that it had been his good or bad fortune to have a good deal to do with aluminum as well as steel castings, and that aluminum, which melted at 700 degrees, had great shrinkage. It seemed to him to be better to regard shrinkage as liquid contraction and to regard contraction as the change in volume occurring entirely in the solid state. If the matter were looked at in this way, the subject of feeding could be put entirely on a scientific basis, as feeding was designed to supply liquid shrinkage.

Pyrometers Discussed.

The next paper was upon the subject of "Some Methods of Measuring High Temperatures," by T. Swinden, Mappin medalist, and associate in metallurgy of the Sheffield University. The paper began with a brief outline of the necessity for this branch

of work amongst iron and steel makers and users. The principles underlying the various branches of pyrometry were then given with a view to pointing out the liability to error in using the different instruments. Resistance pyrometers, with their equipments and some applications were first dealt with. Then followed the thermo-electric instruments of the Le Chatelier type with all the modern modifications, for up-to-date work, by Paul, Bristol and others. Radiation and optical methods were then outlined, and the Fery and Wanner instruments fully described. A number of applications of the latter to foundry work, taken by the author, were given. The following table shows one of these, representing some cupola practice:

Time	Approximate weight tapped, lbs.	Tapping Temperature deg. Cent.	Casting Temperature deg. Cent.
4:10 P. M.	600	1,280	1,240
4:33 P. M.	1,100	1,350	....
4:40 P. M.	400	1,316	1,274
4:55 P. M.	500	1,325	1,255
5:00 P. M.	500	1,355	1,250

Siemen's water pyrometer was then described, as was Uehling's pneumatic instrument. Of this, details were very fully given, together with some examples of its application to hot blast work. The Seger cones, thermophone, fusible pills, etc., were also included for the sake of completeness. The conclusion of the paper took the form of a summary of the points of suitability or otherwise of the various instruments for foundry work. The rather expensive and fragile resistance pyrometers, although of undoubted accuracy, are hardly suitable for foundry work. The thermo-electric instruments come nearer in point of application; the portability, cheapness and reliability of the instruments being greatly in their favor. The optical instruments while possessing both unique advantages and disadvantages are greatly in advance of either of the foregoing, since their application is easy in cases where even thermo couples would be useless. The Fery instrument is a splendid example of this class. The Uehling is, of course, the instrument for blast furnace and hot gas recording. The durability and sensitiveness of both the instrument and records are unquestioned, the cost being the only objectionable point. The water pyrometer is extremely good for intermittent readings where applicable, but its field of usefulness is rather limited. This applies also to the Seger cones, etc., mentioned. Finally, each instrument is only suitable for the especial work for which it is designed, if full benefits are to be derived.

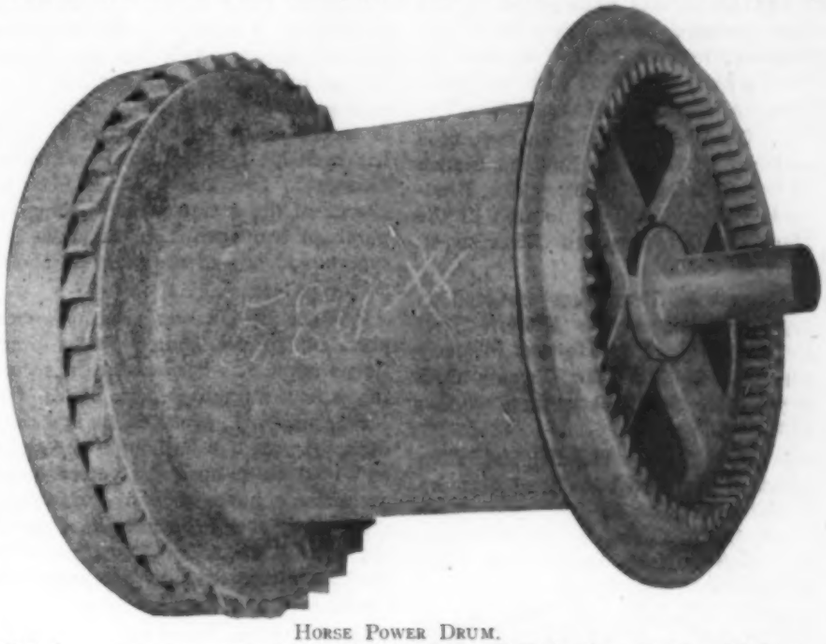
The last paper to be presented to the session, "Notes on the Chemistry of Cast Iron," was read by E. Houghton, of Chesterfield. The paper presented an English view of the subject.

Thursday was devoted to visiting the works of Messrs. Bolckow Vaughan, Ltd., Cargo Fleet Co., Ltd., Richardson, Westgarth & Co., Ltd., and others.

WHAT BOYS CAN DO.

Of the many shops in which the molding machine has recently been brought to the front most rapidly, the plant of the American Hoist & Derrick Co., of St. Paul, Minn., presents a fair illustration. The *Review* of the National Founders' Association reproduces a few photographs, which we copy, of castings made in this foundry on machines operated by inexperienced bright boys during the past few months. Oliver Crosby, the president of the company, has taken a lively interest in molding machines and believes they are fast displacing former methods of molding all kinds of castings. The illustrations are of a few of the many castings produced in his plant. Similar castings are being made very successfully in many other foundries in the country.

ENGINE BRACKET.
(About 3 feet long).
Made by handy man on molding machine.



HORSE POWER DRUM.
Made by a young man putting in part of his vacation. Total foundry experience has been since June 6th. He makes one drum per day.

24-INCH GEAR.
Made by two handy men—inexperienced—on molding machine.

Ship Building in Scotland.—In the first half of the year 1906 Scotland produced an amount of tonnage from her ship yards unprecedented in the history of ship building. In these six months, according to a Glasgow dispatch, the ship yards put into the water no less than 207 vessels of all sizes, with an aggregate tonnage of 360,489. The nearest approach to that record was made in Scotland in 1902, when in six months 259,804 tons were produced. The large output from the Clyde yards was augmented by the launches of the Lusitania, a Cunard steamer of 32,500 tons, and the Agamemnon, a battleship of 16,500 tons, in the closing weeks of the half year.

PERSONALS.

J. Munhall King, secretary of the Laclede Fire Brick Co., St. Louis, resigned Aug. 1.

Thomas M. Voyle has been made manager of the Scranton Supply & Machinery Co., Scranton, Pa.

S. D. W. Cleveland will be secretary of the Syracuse branch of the National Metal Trades Association now being formed.

George W. Hibbard, vice president of the Westinghouse Electric & Mfg. Co., has been elected a director of the Greene Consolidated Copper Co.

Ray Quinn has been made district representative of the American Can Co., with headquarters at Atlanta, Ga. He has been connected with the Hamilton, O., branch of that company.

C. W. Walker has been appointed manager of the New England branch of the Blaisdell Machinery Co., Bradford, Pa., and will be located in the Machinery Exchange, 10 Oliver street, Boston.

Thomas E. Evans has resigned as superintendent of the Eastern Steel Co., Pottsville, Pa. He was formerly superintendent of the Twenty-ninth street mills of the Carnegie Steel Co., Pittsburg, Pa.

J. P. Warfel, Philadelphia, sales agent of the Birdsboro Steel Foundry & Machine Co. for the past three years, has resigned to accept a similar position with the Federal Steel Foundry Co., Chester, Pa.

W. A. Chadwick has resigned as superintendent of the American Steel & Wire Co.'s South Sharon works, Sharon, Pa. He was succeeded by Geo. A. Paff who has been employed in the same plant for several years.

Frank T. Locke will manage the New York sales office of the Mine & Smelter Co., 42 Broadway, New York, after Sept. 10. He was formerly superintendent and manager of the Ticonderoga Machine Works, Ticonderoga, N. Y.

A. H. Carpenter has resigned as assistant manager of the Chicago office of the Republic Iron & Steel Co., effective Sept. 1, and has accepted the position of general manager of the Corona Coal & Iron Co., Corona and Birmingham, Ala.

Harry Zeller, formerly superintendent of the Schonthal Iron & Steel Co., and later general superintendent of the Maryland Rail Co., Cumberland, Md., has resigned the latter position to become connected with the Schonthal iron interests at Columbus, O.

James C. Mears, sales manager in St. Louis for Rogers, Brown & Co., is spending his vacation with his family in Atlantic City, where he will be until September 1. Fred W. Bauer, assistant to Mr. Mears, has just returned from an extended vacation in Ohio.

Archibald D. McAdam, for the past five years local auditor at Detroit for the American Car & Fdy. Co., has been made manager of the sales department of the Michigan Malleable Iron Co. He succeeds W. C. McMahon, who will hereafter devote his attention to the management of the Monarch Steel Casting Co.

Chas. A. Price, former supply agent of the Detroit district of the American Car & Foundry Co., has been promoted to district managership with headquarters at Memphis, Tenn. He is succeeded by John H. Hanna, who has been his assistant for some time. George L. Henrion, who has been in charge of the Memphis plant since its purchase two years ago, will take the superintendency of the plant at Madison, Wis.

William B. Dickson, second vice president of the United States Steel Corporation, has been active in securing some attractive park lands for Montclair, N. J., of which he is a resident. A year ago he bought the lands and held them until the voters could authorize a bond issue of $100,000 to cover their cost. Recently he donated the town a check for $2,300, covering interest charges while he held the lands.

D. S. Jacobus, professor of experimental engineering at the Stevens Institute of Technology, Hoboken, N. J., has resigned to enter the service of the Babcock & Wilcox Co. Prof. Jacobus is one of the best known figures in the engineering profession in the United States. He has held the chair of experimental engineering at Stevens Institute since 1898, having risen to that position through the grades of instructor and assistant professor.

Arthur Appleton has been made resident manager of the New York office, 45 Broadway, of Pawling & Harnischfeger, Milwaukee, Wis., builders of traveling cranes, and will cover New York City, the New England states and eastern Canada. He was associated with Wm. Sellers & Co., Philadelphia, for many years as traveling salesman.

June exports of locomotives were 48, against 21 in June, 1905. More than half of these went to Central American states.

OBITUARY.

Captain E. B. C. Hambley, a well known mining engineer, died Aug 12 at Salisbury, N. C. He was vice president of the Whitney Co., now completing an immense power plant on the Yadkin river.

James Dredge, editor of *Engineering*, of London, died August 16. Mr. Dredge was well known in this country, having been royal commissioner in 1893 to the Chicago world's fair and in 1876 to the Centennial exposition at Philadelphia.

Gustavus W. Nicolls, secretary and treasurer of the Warwick Iron & Steel Co., Pottstown, Pa., died recently. He had been prominent for many years in the iron industry of the Schuylkill valley, having been connected with the Pottstown Iron Co. and the Glasgow Iron Co.

James Beynon, manager of the American-McKenna Process Co., Joliet, Ill., and an expert in steel manufacturing, died at his home in that city, Aug. 13. He was a native of Wales, but came to this country many years ago and held a number of executive positions in the larger steel plants of the west.

Professor Samuel Lewis Penfield, Ph. D., Ll. D. of Yale, one of the most eminent mineralogists of the world, died at South Woodstock, Conn., on Sunday, Aug. 12, of diabetes. He was graduated from the Sheffield Scientific School in 1877, and was a member of the National Academy of Sciences and many other scientific associations in this country and Europe.

CONTRACT FOR MANHATTAN BRIDGE.

The Ryan-Parker Construction Co., of New York city, which was recently awarded the contract for building the Manhattan bridge, has made a contract with the Phoenix Bridge Co. for the fabrication of the material, and the Jones & Laughlin Steel Co., of Pittsburg, will furnish the steel, which will amount to 42,000 tons. This large contract for steel was obtained for the Pittsburg concern by its Cleveland agency, Otis, Bonnell & Co. The negotiations for the contract were conducted by Wm. Bonnell. It is expected that the bridge will be completed in less than three years. The rolling of the steel has already been begun.

Three flask sheds of the Philadelphia Stove & Iron Foundry, Philadelphia, Pa., were destroyed by fire Aug. 10.

FIRE BRICK PROBLEMS OF METALLURGY.

BY A. F. GREAVES-WALKER.[1]

It is now over 75 years since Beaumont Neilson first used the hot blast in connection with the blast furnace. That event marked the beginning of an era of transition in the manufacture of iron and steel. Since then the industry has taken great strides under the guidance of such men as Sir L. Bell, Sir Henry Bessemer, Sir Wm. Siemens, David Mushet, M. Martin and others, and each improvement these great investigators have made has had the same result as Neilson's, higher heats and greater production.

That we are still living in this era of transition and in the most progressive part of it can be seen in comparing the blast furnace of 15 years ago with the blast furnace of today, the latter in a day's run turning out what would be a week's work for the former; also to the recent discoveries, that of James Gayley of the greatly increased efficiency of the dry blast, and that of the Canadian government in which steel is produced from iron ore by means of the electric arc.

As stated above, each step has brought out pre-eminently two results,—higher heat and increased production. These results have made and are ever making more difficult the problem of the manufacturer of the lining material necessary to withstand the heat, fluxes and wear in the numerous furnaces used by the iron and steel manufacturer of today. And the problem does not confine itself to the iron and steel industry alone, but extends to all other industries where heat is employed, the cement, copper, lead, zinc, silver, glass, coke and gas industries being but a few that could be enumerated. Each one of these presents to the fire brick manufacturer its problem.

Before going further it might be best to drop from specific consideration all refractories except the fire clay brick, generally known as "fire brick," although any heat resisting brick is entitled to this name. Therefore, when used hereafter, the term fire brick will mean one made of fire clay, and able to withstand at least, a temperature of three thousand degrees Fahr.

During all these years that the various industries mentioned above have been progressing so rapidly, the fire brick industry, so far as scientific progression goes, has practically been at a standstill. It is nature alone that is responsible for this state of affairs, for as the requirements made on fire brick became more rigid and exacting, new and more refractory deposits of fire clay were discovered, each deposit seeming to possess some particular property which suited it for one or the other of the various new requirements that were continually presenting themselves.

Like all our sciences, ceramics has had its great investigators, among the foremost being Seger, Bischof, Kramer, Keller, and Wedgewood, but these men did not confine themselves to the study of fire resisting clays, their work covering the whole or some part of the industry and only incidently touching refractories. Today there are Prof. Edward Orton Jr., Prof. H. O. Hofman and a few others who are doing great work in this field, Hofman's work being confined almost entirely to investigating fire brick.

For years the famous English brands Stourbridge, Garnkirk, Stevenson and Glenboig, though all practically made in the same way and of clays very similar, were made to answer all purposes in England and on the continent. But by 1875 the Belgians and Germans had developed a much better product, which in a great many cases, through a close study of their application, replaced the English brick.

Not until 50 years ago did the fire brick industry develop to any extent in this country, although fire brick were made in the Colonies before the revolution. The early Maryland, Pennsylvania and New Jersey brick were like the English brick, made to answer all purposes, and on account of the natural good quality or the clays used and the easy conditions under which they were used, they did their work very well. The same conditions existed in the fire brick industry, up to within the last 10 years.

However, the conditions changed rapidly about that time. The marvelous impetus given the iron, steel, and other industries, brought about by the increased use of the metals, coupled with the changing trade conditions, brought the fire brick manufacturers of the United States to a sudden realization that they had been asleep. Most of them partially stemmed the tide by putting on the market several brands of brick, all possibly made from the same clays, but with differences in mixture, grind, molding, pressing and burning.

When an order was received for brick for a certain purpose it was filled with a certain brand, (which in the judgment of the manufacturer, who probably knew nothing about the furnace in which they were to be used, was suitable.) Should this brand fail to give satisfaction, another brand was substituted, and if it failed, as it often did, it is very likely the next order went elsewhere, and the brick, though probably an article of the highest grade was thus condemned, entirely through the ignorance of its manufacture of the conditions under which it was to be used.

Compare these "hit or miss" methods with those of the iron manufacturer, who on receiving an order for pig iron for use in an acid open hearth, knows exactly what to send, and he has gained this knowledge only through the close and thorough investigation that had been made of the acid open hearth process and its requirements.

It is only within the last few years that the most progressive of the fire brick manufacturers have come to realize that they too must do some investigating, and have equipped laboratories and supplied them with trained men, for this purpose. Although this is a long stride forward, one great essential of complete success is still lacking, that being the investigating of each individual furnace, and thus becoming familiar with its construction and working conditions before attempting to supply it with a lining.

Some of the points that must be observed are: the temperature attained, chemical activity of slags produced, whether there is abrasion from the charge or from gas, oil or air blast, the kind and purity of the fuel used, whether the brick come in contact with the metal, slag, fuel or blast and whether used in the bottom, walls or roof. With the above information and high grade clays very little if any difficulty would be experienced in producing a brick that would successfully meet the conditions under which it was used. This is especially true, because the manufacturer can, by varying the amount of plastic and non-plastic clay, the size of grain, the method of manufacture, (whether hand or machine made or dry pressed) and the temperature of burning, easily control the physical properties of his product.

The chemical composition of a fire brick is an important factor in many cases, as sometimes a brick high in silica is required, as is the case in by-product coke ovens, or one high in alumina, as in the case of a lining for a rotary cement kiln.

For the sake of those who are not already familiar with the composition of a fire clay and the chemical and physical properties peculiarly to each ingredient, a short explanation will be necessary.

Composition of Brick.

Pure clay is a hydrated silicate of alumina, having the formula $Al_2O_3 \cdot SiO_2 2H_2O$ and contains but three ingredients, silica, alumina and water, but clay of the above composition is rarely found. Fire clays, whether plastic or non-plastic, al-

[1] Utah Fire Clay Co.

ways contain impurities in the form of titanium oxide, iron oxide, lime, magnesia and the alkalies, the total amounts varying generally from one to seven per cent.

Silica.—Pure silica in itself is quite refractory, melting a little above 3,200 degrees Fahr. In chemical activity it is considered acid, and it has the physical property of expanding under heat. It combines readily with fluxes, especially oxide of iron under reducing conditions, its fusing point being greatly reduced by the slight addition of same. A high grade brick should not contain over sixty per cent SiO_2.

Alumina.—Alumina is much more refractory than silica, melting between 3,500 and 4,000 degrees Fahr. In chemical activity it is basic, and unlike silica it does not combine readily with fluxes, and even the addition of the same in small quantities, does not reduce the refractoriness to any extent.

Water.—The water contained in clay is water of combination; *i. e.* chemically combined and is driven off in burning.

Fluxes.—Oxide of iron is the most common of fire clay fluxes, with lime and titanium second. Magnesia and the alkalies occur in varying but generally small amounts. It is the oxide of iron that gives the fire brick maker the greatest cause for worry, and the consumer realizing the danger of its presence, often judges a brick by the number of "iron spots" on it, or by the amount found on analysis. Although the amount of iron present will not give a fair estimate of the refractoriness of a fire brick, if the analysis shows both high iron and high silica, the brick will never give satisfaction where a high heat is reached.

Silica-Alumina Ratio.—A fire brick should never be judged from its analysis, but a fair idea of its refractoriness can be gained from a glance at its silica-alumina ratio. The nearer this ratio is to 1.15 SiO_2:1.00 Al_2O_3 (which is the ideal) the better, and it is best to beware of a brick in which it runs much higher, unless a high silica brick is required, and in that case, the fluxes must always be very low. An idea is prevalent among a great many users and even some manufacturers of fire brick, that silica increases the refractoriness. This, however, is erroneous, conclusive experiments showing that any addition to the silica content of a fire clay above 46.7 per cent reduces the refractoriness, the free silica acting as a flux. This, however, does not hold in cases where ganister is added in large particles.

The chemical activity of a fire clay brick is usually neutral, although it may be acid in the presence of free silica, or basic in the presence of free alumina. This is a very important point, though one which is often overlooked. It has been found in numerous instances that a brick which is only slightly basic stood up, where a neutral or a slightly acid brick failed.

In the following the writer has attempted to set forth the conditions existing in the various furnaces and heat engines of the iron, steel and other industries, and the properties of the fire brick which the latest practice and investigation has shown to be the most suitable for lining them.

Blast Furnaces.

The conditions existing in a modern blast furnace are extremely severe, combining as they do great abrasion, high temperature and reduction. The furnace is divided into four zones, each of which presents its own problem. First—the zone of fusion and crucible, second—the zone of heat interception, third—the zone of flux decomposition and fourth—the zone of preliminary heating and reduction, including the unoccupied space at the top.

In the zone of fusion, which includes the crucible and lower part of the bosh, the lining encounters the molten iron and slag, together with the most intense heat in the furnace. The brick for this zone should have the combined properties of refractoriness and mechanical strength. Their fusion point should not be below Seger Cone 34, approximately 3,300 degrees Fahr., and they should be dense and hard, with ability to resist the action of the molten slag and metal.

In the second zone, which includes the upper part of the bosh and the inwall, the lining has to meet two very incompatible conditions, one, great abrasion, the other, the high temperature which occurs at the time of irregular furnace working. The stock is in a pasty condition in this zone and thus has a great tendency to either scaffold or tear out the brick work. To meet the conditions existing in this zone, the brick must have the same properties as those used in the zone of fusion, i. e. refractoriness and mechanical strength, but here the mechanical strength should be even greater. These brick should not fuse below Seger Cone 33, approximately 3,250 degrees Fahr. and should be very dense and smooth.

In the two upper zones the conditions are not so severe as regards heat, but there is great abrasion, especially near the top, where the falling of the stock from the bell, and the constant sand-blasting effect of the fine particles in the escaping gases, make it necessary to select a brick which is especially adapted to the resisting of abrasion. The brick in these zones need not stand a heat above Seger Cone 28, approximately 3,000 degrees Fahr. and should be as dense and hard as fire brick can be made. It is important that all fire brick used in a blast furnace lining be fine ground.

In the last two years the furnaces have been driven so hard and the output increased to such an extent that long campaigns are no longer expected. Thirty years ago, eminent authorities said a lining should last 15 or 20 years, whereas the writer knows of a furnace that was lined three times within the last two years, with supposedly high grade fire brick. This, of course, is an extreme case and was no doubt due to the carelessness, either of the manufacturers of the brick used, or of those in charge of the furnace. A lining should last at least from two to five years before renewing.

The latest practice in lining blast furnaces, is to use blocks instead of nine and 13½-inch brick. These blocks are four and one-half inches thick and from nine to twenty-four inches long, averaging about nine and one-half inches in width, and contain from three to twelve nine-inch brick. The great advantage in using these blocks is in the reduction of the number of joints. The raw clay used in laying up fire brick, is always a weak point in all furnace construction. A block furnace lining can also be laid up much quicker than a nine and thirteen and one-half-inch lining.

For years there have been advocates of a thin lining for blast furnaces, the claim being made that such a lining prevented scaffolding and meant longer life for the brick. About 1890, Woods, an English blast furnace authority, tried the experiment of a very thin lining, it being from five to ten inches thick, and claimed perfect success. He had no other method of keeping the walls cool, than the circulation of the atmosphere around the shell. He experienced no trouble from scaffolding and prevented wholly the burning away of the lining. Four years ago, in Geismar, Germany, a furnace was lined with three inches of fire brick from top to bottom; the entire shell, from throat to crucible, being sprayed with cold water. The furnace has given excellent service during a hard, continuous campaign and is still apparently in perfect condition. The success of these experiments may, at some time in the near future, lead to general reduction in the thickness of blast furnace linings.

For many years it has been the prac-

tice among iron-masters to blame nearly all furnace troubles to the lining, thus making doubly hard the fire brick maker's burden. There can be little doubt that many linings go down through the fault of the constructing engineers, or those in charge of the running of the furnace. Too often are furnaces blown in before the brick work has had time to thoroughly dry, or low grade brick are put in places where high grade brick should be used; also through improper or careless driving, the life of a lining is often considerably shortened. The skip-hoist has been blamed by some fire brick manufacturers for the failure of their linings, but it has been shown beyond any reasonable doubt that this method of feeding is helpful, rather than detrimental to a lining.

No fire brick can be too expensive for lining a furnace, as this is such an important and costly piece of work, that only the very highest grade of fire brick should be used.

Hot Blast Stoves.

Although there are many types of hot blast stoves, such as the Box Key, Roberts, McClure-Amsler and Foote, the principle is the same in all and the fire brick requirements are likewise the same.

In a stove, the question is merely one of specific heat and mechanical strength. Refractoriness does not enter into the problem to any extent, as the heat obtainable in a stove is probably not much over 2,000 degrees Fahr., even in the combustion chamber. The brick work must be able to withstand the movement of the stove, which is by no means small, due to expansion and contraction on turning into the highly heated stove cold air and vice versa.

The brick for the purpose must be very strong but porous, for it is well known that a porous brick will better absorb heat, or in other words, a porous brick has a higher specific heat. The life of a well built stove is practically unlimited, and blast furnace managers should have very little trouble with them when once completed.

Cupola.

The conditions existing in a cupola are very much the same as in the blast furnace, except that it is on a small scale. The same lining requirements hold also, for the lining must be refractory and have mechanical strength. A cupola lining is subjected to intense heat near the tuyeres, and always to a great deal of abrasion. The cupola blocks should not be so finely ground as blast furnace brick, as the action is not continuous and some allowance must be made for contraction and expansion.

Malleable Iron Furnaces.

One of the greatest problems before the fire brick manufacturer, is the production of a long lived "bung" brick. The remainder of the furnace is not so troublesome. The conditions met with and to be overcome are numerous. First, since it is a flame furnace the purity of the fuel is a great factor. With a fuel high in fusible ash, the fluxing action of the small particles carried over by the draft, which stick to the hot bung and are fused thereon, cut a large figure in the destruction of the brick. Second, the bung acting as a deflector for the flames, is subject to intense local heat. Third the raising of the bung from a white hot furnace and exposing it to the cold air is extremely severe. This last is a test few brick will pass through successfully. At present about 30 heats is about the life of the best bung.

A brick to stand the severe conditions of a bung, must above all be coarsely ground, *i. e.* contain a large percentage of large particles and should be burned only hard enough to withstand shipment. It is the proper combination of the above two properties that give the best results. The reason for this is evident. If a coarse ground, soft burned brick be broken and examined, it will be found that the larger particles are loose and can be easily removed by picking with the finger nail. This shows that there are unoccupied spaces around them. When a bung is raised from a highly heated furnace and exposed to the air there is very rapid contraction; then the unoccupied spaces around the particles take up the contraction of the denser matrix, and thus prevent the brick from cracking or spalling. Should the brick be hard burned, however, and made one compact dense mass, the rapid contraction would cause the brick to spall.

Heating Furnaces, Oil, Gas and Flame.

The types of heating or mill furnaces are so numerous and their uses so varied that they will only be dealt with generally. Special attention will be paid to the fuel used, as it seems that this, more than the use to which the furnace is put, indicates the kind of brick best suited for its purpose.

Oil Burning Furnaces.—These furnaces are used to some extent wherever oil is easily procured. The oil is fed in under pressure, entering the furnace in a spray, where it is ignited. The brick exposed to the spray are subjected to an intense heat, caused by the combustion of oil on their surface. This has a tendency to "eat" away the surface of the brick. Brick used in these furnaces are generally subjected to changes of temperature. It will be seen then, that these brick are exposed to two incompatible conditions—one requiring a dense hard surface which will prevent penetration of the oil, the other requiring a coarse, porous brick which will not crack or spall on exposure to variations in temperature.

It has been found that brick made by the wet process do not stand up in these furnaces as well as those made by the dry or semi-dry process. In the dry press brick, sufficient porosity is obtained and at the same time they have good hard surface. The writer suggests using on the wet process brick, a coating of sand, which is fusible at kiln temperatures. This when fused would make an impenetrable surface, and the brick could be burned to such a temperature as would permit its use in this work. It has been suggested by A. J. Aubrey of St. Louis, that the exposed brick be given a wash of carborundum, which would prevent any penetration of the oil.

Gas Furnaces.—The conditions existing in a gas fired furnace are about as hard on fire brick as those in the oil furnace. The variations in temperature are the same, but instead of the brick being eaten away, as by the oil flame, they are cut and disintegrated by the blast of the gas and air where ever they are near the ports. The dry press brick serves best for this purpose, although a medium burned wet process brick, having a good percentage of large particles and a tough skin, will answer the purpose almost as well.

Flame Furnaces.—In these furnaces the problem is very much easier than in the other two mentioned above. The roof brick in these furnaces, besides being exposed to intense heat, are subjected to the fluxing action of the ash carried by the flame. A very coarse ground and soft burned brick, gives the best service in this type of furnace.

Heating furnaces do not as a general thing, require the highest grade fire brick *i. e.* brick that fuse at Seger Cone 34 or above, except possibly in portions exposed to intense local heat. A brick fusing at temperatures from 3,000 to 3,200 degrees Fahr. should answer the purpose.

It is safe to say that heating furnaces taken as a whole, are about the most troublesome proposition the fire brick manufacturer has to contend with. The numerous types, the many uses, the different kinds of fuel and the difference in practice, make it almost impossible to supply a lining that will give satisfaction without first investigating the peculiarities of the furnace to be lined. This is strikingly illus-

trated in the results of an experiment in which the writer was personally interested. A large foundry company, having plants in several cities, decided to make a comparative test on the life of three brands of fire brick which gave the best service in their heating furnaces. They selected for the test, two furnaces, both burning oil and exactly alike in construction, but located in different cities and under different management. Of the three brands selected, one was of high grade Maryland clay, one of high grade Kentucky clay, both of these made by the wet process, and one of high grade Pennsylvania clay, made by the dry process.

Two good samples of each brand were selected, duplicates in every respect, and these were put, one in each furnace, where they would get the greatest heat.

The results were rather surprising, one plant reporting as follows:

Pennsylvania dry process.....11 days
Kentucky wet process..... 6 days
Maryland wet process..... 2 days

The other plant reported:

Maryland wet process..... 9 days
Kentucky wet process..... 6 days
Pennsylvania dry process..... 1 day

As will be seen the reports were directly opposite and prove one thing conclusively, that each individual furnace must be studied in order to get good results from the lining. Guessing methods on the part of the fire brick manufacturer will only give such results as are shown above.

Open-Hearth Furnaces.

Clay fire brick are not used in the exposed parts of the open-hearth furnace, the inner lining being of silica, magnesite and chrome brick, but they are used in the lining and checker work of the regenerator chambers. These brick are exposed to the same conditions as those used in the hot blast stoves, except that they are heated to a higher temperature and are not subjected to such a straining, superimposed weight. As mentioned in connection with the hot blast stoves, porous brick have the best heat absorbing qualities, and so in the case of these chambers, a porous, though not necessarily highly refractory brick serves best. A fire brick which fuses at Seger cone 28, approximately 3,075 degrees Fahr. is considered refractory enough. On account of rapid changes in the temperature of these chambers, (the changes from hot gas to cold air and vice versa, taking place every fifteen to thirty minutes) the joints between the brick are subjected to great strain, often opening and allowing gas to escape into the air chamber and ignite. This can be prevented by binding well at the exposed places.

Siemens Crucible Steel Furnaces.

In a crucible furnace it is necessary to contend with a heat which only the very highest grade brick can resist. Besides this, both the lining and arch brick, and the regenerator checker brick must be able to withstand variations in temperature. It is therefore necessary for lining and arch to use a brick that will withstand at least Seger cone 34, approximately 3,300 degrees Fahr. The brick should be coarse ground and rather soft burned. The regenerator brick should be the same as those described for open-hearth regenerators.

Soaking Pits.

In the soaking pit, intense heat and variations in temperature are encountered. The lower walls, the part exposed to the most intense heat are lined, in the latest practice, with chrome brick, only the upper part being lined with fire clay brick. These brick, however, must be of highest quality, as they must stand very high temperatures. Here again a coarse ground, mechanically strong brick serves the purpose best, as a dense brick would be very likely to spall.

Mixers.

In these furnaces or vessels is stored and mixed the molten iron from the different casts of the blast furnace, and the heat maintained in them is necessarily high. The most important consideration in the brick for this purpose is refractoriness. A good blast furnace brick would give excellent service in a mixer.

Ladles and Hot Metal Cars.

Ladles and hot metal cars are subjected to very rapid changes in temperature, one minute being full of molten metal, the next rapidly cooling in the open air. A brick for a ladle or car lining need not necessarily be very refractory, but must be so made as to stand the varying temperature changes. Either a coarse ground, medium burned, wet process brick, or a hard burned dry or semi-dry pressed brick of second quality will answer well.

Boiler Settings.

It is seldom that a high grade fire brick manufacturer considers a boiler setting worthy of consideration, but there are many cases where only the highest grade brick will give satisfaction. This is generally the case with large vertical units, of the Babcock & Wilcox or Stirling types, of from 500 to 750-horsepower. It is the fire box arch that gives greatest trouble, and there can be no doubt that these arches are subjected to intense local heat, besides being exposed to variations in temperature and to the fluxing action of the ash deposited by the flames.

In the writer's opinion the most successful brick in cases of this kind is the high silica flint clay brick such as is used in by-product coke ovens. This brick runs from 56 per cent to 60 per cent silica, is very free from impurities and fuses at cone 34, approximately 3,300 degrees Fahr. A high grade brick of ordinary analysis will answer this purpose, but it must be coarse ground to allow for rapid contraction.

Copper Reverbatory Furnaces.

The copper furnaces are the ordinary type of reverbatory furnace, and on account of the peculiar conditions they present, have been a very hard problem for the fire brick maker. The bath and walls of the furnace are lined with silica brick, but they will not work in the flat arched roof. The roof, acting as a deflector for the flame, is heated to a very high temperature, and is exposed to fluxing action of ash. Besides this, the roof brick seem to absorb the vaporized copper and other constituents of the ore to such an extent, that after about four months service it is necessary to take them out and smelt them. At this time a seven-pound brick will weigh from 15 to 18 pounds, and seems to be a mass of copper.

After a great deal of experimenting it was found that a basic clay brick gave the best service. It is necessary that the brick be fine ground and very dense, these two properties preventing excessive absorption of the vapor.

Lead Smelter.

In this furnace also is found a peculiar difficulty. Refractoriness does not enter into the consideration, as here it is the ability of the thin watery slag and heavy molten lead to force their way through the pores of the brick to the furnace shell that cause trouble.

Fire brick made of clay seem to fail in this case and it has been necessary to adopt other refractories. A. J. Aubrey recently experimented with bauxite brick for the courses around the slag line and found them to give excellent results.

Coke Ovens.

Bee-Hive Ovens.—There are no severe conditions to be encountered in a bee-hive oven, but nevertheless under estimation of the conditions existing, both by the fire brick and coke manufacturers, has led to the construction of plants that have almost doubled their original cost in repairs within the first three years of service. A by-word among fire brick makers has been that "anything will do for a coke oven." This has been partly brought on by the deceptive methods

used by some mine operators, in building "dummy" ovens as a means of getting cars from the railroads, and partly because only first cost has been considered in putting up a coke plant.

There is no doubt that it is the best policy to use a high grade fire brick for this service, for although it increases first cost, there is really no limit to the life of the oven if properly built. The writer knows of ovens that were built ten years ago, in which only high grade material was used, which have been in continuous operation during that time, that are in as good condition today as when built. Brick for this work should be coarse ground, strong, and burned to a good density, though they must not be too hard.

Bee-hives built entirely or with crowns of silica brick are strongly advocated by some engineers and silica brick manufacturers, but it has never been shown that such ovens have any advantage, either in life or production over ovens built of good clay fire brick.

By-Product Coke Ovens.—There are two principal types of these ovens in use in this country, the United-Otto and the Semet-Solvay, the former being in greater number.

In both of these systems the principle is the same. The coal to be coked is placed in air tight chambers which are surrounded by flues in which gas is burned, the chamber walls conducting the heat from these flues to the distilling coal.

In construction, the two systems differ from each other in many ways, but the difference which concerns the fire brick maker most, is the method of constructing coking chambers or ovens, In the United-Otto, the walls of these chambers help to support the superstructure, thereby requiring a brick that will withstand a compressive strain while at a high heat. In the Semet-Solvay, the chamber walls hold only their own weight, the roof being supported by piers. Both methods have their advantages. The temperature in the combustion chamber and flues, the hottest parts of the ovens, ranges from 2,000 to 2,500 degrees Fahr., and the temperature in the regenerators, through which the gas and air passes before reaching the combustion flues, does not rise above 1,800 degrees Fahr.

The cooling of these ovens every 24 hours, and the contact of the coal, when wet, with the walls, are quite severe on the brick work. It will be seen therefore, that the brick for these ovens must have the following properties: refractoriness, high heat conductivity, ability to withstand variations in temperature, ability to resist abrasion, and ability to stand compression strains at high temperatures.

The heat attained in these ovens is not very high, but the constructors limit the minimum fusing point of the brick used to about cone 33. The brick must also show no signs of vitrification, swelling or shrinking at cone 16, approximately 2,650 degrees Fahr.

Although it is a fact not generally known, even among fire brick manufacturers, clay fire brick are the poorest conductors of heat of all known refractories, while silica brick are the best. But while silica brick would answer the best in the chamber walls so far as heat conductivity is concerned, (they are used to some extent by the United-Otto,) they do not have all the other qualifications necessary. Their use would also increase materially the cost of construction. It is therefore necessary to make a clay brick as high in silica ($Si O_2$) as the temperature limit will allow, for as mentioned before, the higher the silica content, the lower the refractoriness.

The silica content is therefore limited to about 60 per cent, which in a brick very low in impurities would give a fusing point of about cone 33, approximately 3,200 degrees F.

A brick fairly free from fluxing impurities, but high in silica, can be burned to at least cone 12, and still not be so dense as to be unable to withstand changes in temperature. The test given by the constructors, is heating a number of brick to a high temperature, then withdrawing and covering them with wet coal dust. This is extremely severe and a brick that can withstand this test without spalling or cracking will stand all working conditions.

The brick should be hard and dense enough to withstand the abrasion of the coke when it is being pushed out.

Very little is known as to the ability of various fire brick to withstand compression strains at high temperatures, but this is undoubtedly an important factor in the construction of coking chamber walls that support superstructures.

Some of the very best investigation work along this line has been done by Lemon Parker of St. Louis, and his results can be found in Vol. VII, "Transactions of the American Ceramic Society." Parker is of the opinion, that a brick made of silicious clay will only serve as a good load carrier up to a temperature of 2,400 degrees Fahr., and as the temperatures attained in these ovens do not far exceed this, it is likely that the brick which have been found to fill all other requirements well, will also fill this one. The checker brick used in the regenerators should have the same properties as those described for open-hearth regenerators.

In the above, only a few of the most important uses of fire brick have been generally touched upon. There are hundreds of other uses, some of them quite important, but they do not present very difficult problems to the fire brick manufacturer, and so have been passed over.

It might be well to say a few words about the clay used in laying up fire brick. A great many manufacturers lay great stress on using the same clay for this purpose, as that of which the brick are made. There is no possible reason why this should be done, and in a great many cases it should positively not be done. Some brick are made almost entirely of non-plastic flint clay, which cannot be ground by any ordinary methods to the fineness necessary for mortar purposes. To attempt to use such a mixture, only results in a poor job, with joints easily attacked by slags and metals.

For all classes of work, a good high grade plastic No. 2 fire clay with possibly a small amount of flint clay, should be used. This will make a creamy, sticky slip, which will make an excellent joint. As mentioned above the joints are always weak spots and are therefore a necessary evil. The brick should always be dipped into the mortar, which should be of the consistency of cream and rubbed on each other to make a good tight contact.

It is safe to predict that many, if not all of the fire brick problems, will be solved by the fire brick manufacturers within the next few years. They can be aided materially in this by the co-operation of the metallurgical engineer, who by careful designing can build furnaces, in which the fire brick are not placed in such positions as to make it impossible for them to stand for any length of time.

Coke Output of 1905.—According to statistics of the Geological Survey, the coke output for 1905 was 32,231,129 short tons, a gain of 36 per cent over the output of 1904 which was 23,661,106 tons. The increase in value was in still greater ratio—from $46,144,941 in 1904 to $72,476,196 in 1905, a gain of 57 per cent. The average price in 1905 was $2.25 per ton, as compared with $1.95 in 1904. There was an increase during the year of 12 coke-making establishments and 3,968 ovens. There were under construction, at the close of 1905, 4,751 ovens. Pennsylvania is credited with producing 64 per cent of the total coke product, and West Virginia ten per cent, and Alabama follows next with eight per cent.

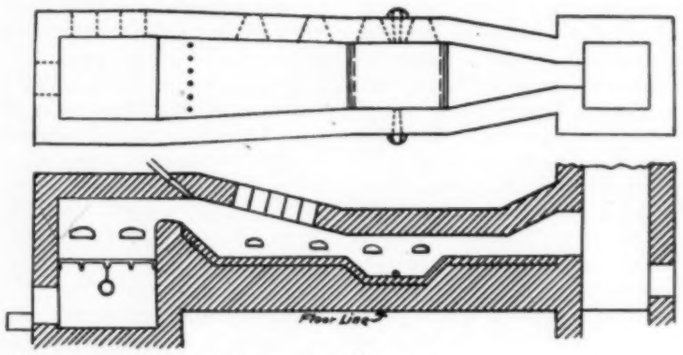
MALLEABLE CAST IRON.[1]

BY G. A. AKERLIND.

In 1722 Reamur published the fundamental principles for the malleable cast-iron process, but it is of comparatively recent years that the industrial world has utilized this knowledge. It was found that if a casting too hard to work were exposed to a continuous high heat for a number of days, embedding in roll scale or iron ore, the casting would entirely change its nature, and at the time stated Reamur had collected those observations and found the principles which governed this change in the cast iron. The present generally accepted theory of the malleable cast-iron process is to decarbonize the metal by some oxide which will impart a portion of its oxygen to the carbon in the metal at a red heat, forming carbonic oxide, which is given off, thus extracting the carbon. The oxidizing reagents usually employed are roll scale and red hematite iron ore.

It is important that this material should be as free as possible from sulphur, which is the most objectionable substance in malleable cast iron. The theory as expressed above does, not, however, seem to cover the field, as malleable castings are now produced without any decarbonizing material, the hard iron castings being packed in fireclay or sand instead of roll scale or hematite ore. For small castings this treatment gives tolerably good results, but for heavier castings, tests and analyses show an inferior product.

Malleable cast iron is produced from hard or white castings. The furnace most commonly used in malleable foundries is of the reverberatory type, as this furnace has the great advantage of melting the charge without the fuel coming in contact with the metal. These furnaces vary in details of construction, but the accompanying illustration will give an idea of the general arrangement. The ash pit is enclosed and contains the air inlet from the blower. The grates are charged (commonly with good bituminous coal) through side doors, which are hermetically closed except at the time of charging. The flame passes the bridge and in some furnaces there is given an additional supply of fresh air forced through a number of small pipes and in the direction the gases travel. The hearth is slightly inclined towards the bath where the molten metal collects, and on this hearth is piled the charge to be melted. The roof immediately over the hearth is composed of a number of built up arches which are handled by a small traveling crane. In charging the furnace these arches are removed and when again placed in position all cracks or joints are closed with fireclay. A little above the high level of the bath are located on each side of the furnace rather small rectangular openings. Through these the events inside the furnace are observed, and wrought-iron bars are inserted for skimming off the slag and for "rabbling" or puddling the molten metal until the desired quality is reached. Beyond the bath is the "choke" and finally the smoke stack, about 75 feet to 100 feet high. At the bottom of the bath, on each side of the furnace, are located the tapping holes closed by a clay plug as in a cupola. The day's work is started by charging the furnace with pig iron, wrought iron scrap or old steel rails in such proportions as is deemed desirable for the castings to be made from the charge.



REVERBATORY FURNACE.

During the process of melting, which takes three to four hours, the grate surface is kept even to prevent cold air from entering the furnace, and when the charge commences to melt such parts as show a tendency to bake together are separated and led towards the bath where the slag formed is skimmed off so as to present a clean surface of molten metal to the flame in order to get the full benefit of the heat. After the charge is melted down the bath is vigorously "rabbled" or "boiled" to insure a thorough mixture, and to reduce the percentage of silicon to the desired point. This point is determined by dipping out a sample which is rapidly poured into a cast-iron mold, quickly cooled, and broken. If the fracture indicates the presence of graphitic carbon the "rabbling" is continued until a sample is procured whose fracture shows the desired composition or state of the metal. The tapping goes on from both sides of the furnace at the same time, and within about thirty minutes the whole charge is emptied and the furnace is allowed to cool down to receive a new charge.

The castings are removed from the flasks, the sprues and vents are knocked off and all cores cleaned out. The metal is now almost as brittle as glass, and some care has to be exercised in its transportation to the annealing house. Here castings of similar weight and sections are grouped together, and carefully "packed" in cast-iron boxes or frames varying in size to suit the articles to be annealed. The first one of these frames is placed on a cast-iron plate resting on two blocks in such a manner that the prongs of the hand-charging machine can enter under. The pieces to be annealed are placed so that they may be completely surrounded by the packing material (roll scale or red hematite ore), and care is taken that some parts of the castings project over the edges of the box, in this way forming a guide for the next section.

A pile about five feet high is formed in this manner, and when completed, removed by the charging carriage to the annealing furnace, where the piles are placed in rows so as to allow the flames from the fire grate free play. The opening of the annealing chamber is finally bricked up tight, and the fire started. These annealing furnaces are arched chambers about seven feet high by twelve feet deep and eight feet wide, with canals in the sides and under the floor so arranged as to convey the flames and the hot gases evenly through the rows of piles, and thus produce an even temperature. Natural draught is used, and the firing carefully moderated during the whole period of annealing from two to six days or more, depending on the character of the castings.

The temperature is brought up to a bright cherry red, or about 1,800 degrees Fahr. The furnace is provided with sight holes for observation, and the blue flames at the joints of the boxes give an indication of the process going on inside where the combined carbon leaves its union with the iron to combine instead with the oxygen, in turn loosened from its combination with iron in the ore or scale, forming carbon dioxide.

[1]Abstract of a paper read at the April meeting of the Scandinavian Technical Society.

After the furnace is sufficiently cooled down, the temporary brick wall in the opening is removed, and the piles taken out by the charging carriage, and placed on the floor, where the now annealed castings are taken out and placed in the rattlers for cleaning. If the castings are small and of delicte construction they are cleaned by being placed in wooden vats containing a weak solution of sulphuric acid and "pickled." To neutralize the acid after the pickling process, these castings are finally washed in lime water. After the annealed castings leave the rattlers they are carefully examined for cracks or other defects, and if sprung out of shape they are hammered or forced by hydraulic power to the correct shape. Such parts as are produced in great quantities are placed in a drop hammer and one or two blows will insure its correct form. It may here be mentioned that nothing is gained by heating a malleable casting before hammering or forging it. A temperature of 50 to 100 degrees Fahr. seems to be satisfactory.

I have endeavored to review the manufacture of malleable cast iron in its different stages, and I will now attempt to review some points which have a more direct bearing for the practical engineer or draftsman in considering malleable cast iron as a material of construction.

The tensile strength of malleable cast iron varies between 40,000 pounds and 50,000 pounds to the square inch, with an elongation in six inches of about six per cent to one per cent, and a reduction of area of about three per cent to three-fourths per cent, respectively. This, of course, is for a specially-prepared test piece of symmetrical form. Cast iron has a tensile strength of about 20,000 pounds to 30,000 pounds to the square inch, and is, therefore, about half as strong as malleable cast iron. This, however, refers only to tensile strenth. For compressive strength cast iron is the stronger of the two, and compares very nearly with steel. The position of a casting in a machine is oftentimes such that the definite stresses are very difficult, not to say impossible, to determine; and the engineer is here left to his own judgment, based on experience or the precedence of similar cases. The reason malleable cast iron is used to such a large extent in car construction today is not only the constantly increasing demand for reduced deadweight, but still more the rapid supplanting of wood by steel and the consequent substitution of rivets instead of bolts. The ductility of the malleable casting very readily permits the driving of rivets, which cannot so readily be done with gray cast iron, and for certain parts of cars, like the journal boxes, malleable cast iron may well be considered to be supreme, leaving cast iron and "semi-steel" far behind, although for this particular detail lightness alone determines its use.

While white cast iron shrinks a great deal more in the flask than gray cast iron, and as the sections of malleable castings invariably are lighter than is the case in similar castings of gray iron, fractures are very common, and it is therefore one of the designer's very first considerations to so arrange and distribute the metal as to meet these conditions. In pieces of an elongated shape the stiffening ribs should extend lengthways so as to produce as little resistance as possible to the contraction of the metal at the time of solidification in the flask. If this be not possible, the molder provides a "crush core" with the exterior surface made of core sand in the usual manner, but whose interior is filled with crushed coke. This core barely stands handling, and when the metal solidifies in the flask it is crushed by the casting and thus prevents shrinkage cracks. At other times a certain corner or juncture of ribs in the casting will be found cracked. In order to prevent this a small piece of cast iron (chill) is embedded in the sand at this critical point, and the metal will cool here more quickly than elsewhere, and thus fortify this particular point, although it may happen that some other part of the casting will be found fractured instead, and in many cases the locations and the shape of strengthening ribs in the casting must be altered until a casting is procured free from shrinkage cracks. Sometimes such defects do not appear until the casting is annealed, which, of course, entails a greater loss than if the casting had been scrapped before entering the annealing furnace.

In conclusion, let me summarize the points I would like to emphasize regarding the designing of malleable cast-iron details.

(1) Endeavor to keep the metal in different parts of the casting at a uniform thickness, depending on the size and weight of the casting. In a small casting, of say, ten pounds weight, one-quarter inch metal is about the practical thickness, five-sixteenths inch metal is about right for a casting of fifteen pounds to twenty pounds, and three-eigths to seven-sixteenths inch or one-half inch for castings of, say, forty pounds and over. This is for freight car castings, with which I am most familiar. For commercial reasons the demand for light malleable castings sometimes forces the designer to give such dimensions for thickness of metal in his casting that the foundry cannot make it successfully, or else the manufacturer will insist on a price per pound that will protect him for the extra expense in making it and the loss due to a high percentage of cracked castings. These losses sometimes amount from ten to twenty per cent. It is therefore generally better policy to modify the design to suit the foundry, although on the other hand, these same commercial interests on your side have to be guarded as those prompting the foundryman to insist on a heavy, easy casting.

(2) Always endeavor to avoid sharp junctions of ribs or parts, and if the casting is long—say, 24 inches or more—bear in mind that the ends should be made of such shape as to offer as little resistance as possible to the contraction of metal when cooling in the mold.

If called upon to inspect malleable castings as to strength it is customary to break them with a sledge or under a "drop" and the difficulty of breaking them and the appearance of fracture forms the basis of opinion. A "good" casting will be found a pretty tough member to break. A fracture will show a distinct "skin" like wrought iron, while the interior is finely granulated, of a dark bluish color, without metallic lustre. A "bad" castihg is comparatively easily broken, does not show the skin, but does sometimes show a very dark bluish color, or in other cases a dark gray cast-iron fracture. This is generally attributed to "poor annealing," but if the metal in the furnace at the time of pouring does not have the right composition the resulting casting cannot be annealed. To guard against this it is sometimes practical for important castings to provide a small extension on a chunky part of the casting where the chilling effect of the molding sand would be least and break off this extension. The fracture will then show whether the metal is of the proper nature for annealing or not. It should be remembered, however, that there is such a thing as over-annealing—but in the present busy time this is hardly likely to occur very often.

As for patternmaking it may be mentioned that the common shrink rule, one-eighth inch per one foot longer than the ordinary rule, is used. Malleable cast iron shrinks more in the mold than gray cast-iron, but in the annealing process a slight swelling takes place.

The first pattern is made of wood,

and from this the foundry patterns are made of aluminum, to which metal we are greatly indebted for the present growth in the malleable foundry business. Without aluminum patterns heavier castings could not be made economically, as the old-fashioned brass patterns required two or more men to handle them. A pattern shop in a malleable foundry is nowadays a far more comprehensive institution than formerly. The woodworking department is still here, but in addition a small foundry for the aluminum castings and a machine shop with planers, shapers, lathes, and drill presses, etc., will be found. As in most foundries the foreman patternmaker represents a great deal of "brains" of the establishment, and it is generally with him the engineer has to consult in regard to the feasibility of his design or overcoming difficulties developed in the making of a casting. The facts of the matter are that it is in co-operation by the individuals concerned in the actual production of a casting, a machine or what-not, that the best results are obtained.

OUTPUT OF SPECIAL IRONS.

The production of ferro-manganese alone in the United States in the first six months of 1906 amounted to 33,207 tons, against 26,965 tons in the last half of 1905 and 35,221 tons in the first half of that year, according to the *Bulletin* of the American Iron & Steel Association. The production of spiegeleisen alone in the first half of 1906 amounted to 127,626 tons, against 137,684 tons in the last half of 1905 and 90,113 tons in the first half of that year. Ferro-phosphorus was not reported in the first half of 1906, but in the last half of 1905 it amounted to 37 tons, against 1,206 tons in the first half of that year. Nor was ferro-Bessemer reported in the first half of 1906, but 250 tons were produced in the last half of 1905, as compared with 2,500 tons in the first half of that year.

The Armstrong Bros. Tool Co., of Chicago, has just shipped two orders received recently from the Isthmian Canal Commission, aggregating almost one thousand Armstrong tool holders, many heavy sizes being included. It has also received recently an order for universal ratchets for use in the canal zone. Many smaller shipments had preceded these later and larger orders.

The South Chester (Pa.) Tube Works will resume work in some departments Sept. 1, after several weeks' idleness.

THE AMERICAN ENGINEERS AT CARDIFF.

The British Institution of Mechanical Engineers met at Cardiff, Wales, from Monday, July 30 to Friday, Aug. 3. An invitation was extended the American engineers who attended the meeting of the Iron & Steel Institute in London to be present at the Cardiff meeting, and a number of them availed themselves of the privilege. A number of papers were read and discussed as follows:

"The Development of Blast Furnace Blowing Engines," by Mr. David E. Roberts; "Some Notes on the Equipment of Collieries," by E. M. Hann; "Manufacture of Tin Plates," by R. Beaumont Thomas; "Railway Motor Power Traffic," by T. Hurry Riches and Sydney D. Haslen; "Large Testing Machines in South Wales, 1829 to 1906," by J. Hartley Wicksteed. In addition there was a series of papers on the shipping of coal: at Cardiff, by Henry S. C. Ree; at Penarth, by T. Hurry Riches and T. E. Heywood; at Newport, by John MacCauley.

A large number of excursions and entertainments were provided for the members and guests. The following account of the meeting was written for THE IRON TRADE REVIEW, by Prof. William Kent, of Syracuse University, one of the American visitors.

Prof. Kent's Account.

Not more than a dozen of the American party went to Cardiff, the great majority going on the northern trip of the Iron and Steel Institute, but those who went were fully satisfied that they had made a wise choice, for never was there an engineers' meeting more thoroughly enjoyable. The sessions were full of interest to technical men, and the visits to works and docks, the receptions, garden parties, luncheons, banquets, and the Welsh concert, were all so admirably managed as to make the meeting really an ideal one.

In the first place the pamphlet entitled "Detailed Program" is worthy of especial comment. The cover contains a dozen half tone reproductions of photographs of things to be seen in Cardiff and vicinity, including a view and a map from an old print and a view dated 1820 of the method then in use for loading coal at a dock. There is a small schooner at a primitive wooden pier, and a single horse is pulling three small cars, containing say one ton each, on a narrow track leading to the pier head. Cardiff now has 180,000 inhabitants, and ships 20,000,000 tons of coal a year. It is the largest coal shipping port in the world, and does also a large importing business. The program, besides giving a list of the papers, excursions, etc., including a special ladies' program, and a list of works open to visitors and the names of the members of the reception committee, over 200, contained six maps, handsomely printed in colors on stiff paper, giving the visitors the clearest possible idea of the location of every point in which they might be interested, including hotels, railway stations, place of meetings, public buildings, docks, works, etc., with red dotted lines and arrows showing the course of each trip on the several days. Besides the program there was a pamphlet of 66 pages giving descriptions of works open to the visit of members. Each of the American party, on accepting the invitation to go to Cardiff, received before leaving London, a large packet containing not only the program and pamphlet, but also pamphlet copies of all the papers to be read at the meeting, engraved invitations to excursions, luncheons, etc., and railway tickets for the several trips.

On arrival at Cardiff there were the members of the reception committee with badges, each anxious to do everything possible in the way of giving information and of entertaining the guests. The meeting was not a notably large one, about 350 in all, including ladies and guests, although the Institution has over 5,000 members; but the small attendance was really an advantage to those who went, since it prevented overcrowding. For Tuesday and Wednesday afternoons, and Thursday and Friday, all day, several optional trips were provided, so that at no place was there any crowding. The American guests had an especially good time, always being given the choice seats at entertainments, alongside of the officers of the Institution and the head men of the reception committee.

The Docks at Cardiff.

From an engineering standpoint, decidedly the most interesting thing to be seen at Cardiff were the docks and the methods of loading coal. The docks are of immense extent, are built of cut stone throughout, and are provided with locks, by which high water is always maintained inside, although the rise and fall of the tide amounts to 40 feet. The problem of handling 20,000,000 tons of coal per year, in cars containing not over 10 tons each, and loading it into vessels so rapidly that a 2,500-ton vessel comes into the dock at high tide, and leaves on the

same tide, that is, within two hours, is one that involves engineering of the highest class, and has been solved in characteristic English style, by the use of high-speed hydraulic machinery. The cars are pulled into place by ropes run on capstans driven by three-cylinder hydraulic engines, rotated 90 degrees on a turn-table, run by gravity onto a hydraulic lifting table, which lifts at a speed of 180 feet per minute, and automatically tipped endwise into a short chute, which delivers the coal into an "anti-breakage box," which is rapidly lowered by a derrick into the hold of the vessel. The ten-ton car was criticized by the American engineer, as taking more than twice as much yard room as an American 40-gross-ton car would for a given daily coal tonnage, involving vast expenditure for yard room, where dock yards have to be built of solid stone and of great depth to reach a solid foundation, but to throw away these small cars would involve the reconstruction of the whole system, including handling appliances at the mines, tunnels, stone platforms, and the widening of the spaces between tracks; so the 10-ton car has to be submitted to, as far as the existing docks are concerned.

Besides the docks at Cardiff, there are similar docks at Penarth, in the near vicinity, and at Newport and Barry, a few miles distant. The Barry docks were started only 17 years ago, and since that time the town has grown from nothing to a population of 20,000. It is totally different in appearance from the ordinary new American town. It has well paved streets and every house is built of brick. There is an air of comfort and prosperity, and a "finished" look, which is absent in our towns.

The new Dowlais-Cardiff steel works were especially noticeable on account of the 160-ton Talbot furnace, which is said to have cost over £100,000. It is giving good satisfaction as regards quality of product, but the cost of repairs has yet to be determined.

Newport Transporter Bridge.

One of the notable things seen at Newport is the "transporter bridge." The Borough of Newport consists of the old and new towns, the former occupying the western, and the latter the eastern bank of the river. The two portions are connected by a stone bridge of five arches, built in 1800, which was widened in 1866 by the construction of cantilever foot-paths on both sides, and by a transporter bridge somewhat similar to those erected on the continent. The principal dimensions are as follows:

	Feet.
Span, center to center of towers.....	645
Span between faces of piers.....	592
Clear height to underside of stiffening girder from high-water mark, ordinary spring tides	177
Height of tower from pier cap, or level of approach road, to saddle.....	241½
Distance between centers of anchorages.	1,545
Center of tower to center of anchorage.	450

The foundations are set in marl about 80 feet below the river bank, and the piers, eight in number, are placed in groups of four on each bank. Each pier consists of a masonry well or monolith mounted on a steel curb 20 feet in diameter. Each anchorage weighs approximately 2,000 tons.

The towers are of lattice steel construction, the main members of the legs being formed of angles and plates riveted together in the form of a cross.

The upper part of the tower above the platform is rigidly connected by three tiers of lattice girders and heavy bracing, and the extreme top is heavily reinforced by joist sections. On the top of each masonry pier a heavy cast-iron saddle is fixed, which carries a rocker or articulation pin, on which rests in turn an inverted saddle connected to the tower leg itself. The calculated weight of a tower is 277 tons.

The suspension cables are 16 in number, four inside and four outside each of the stiffening trusses. Each cable is composed of 127 wires, giving a total section of 3,945 square inches. The anchor cables are also 16 in number, the section of each being 4,273 square inches. The suspension and anchorage cables have an estimated weight of 196 tons, and the diagonal cables 19 tons.

The traveling frame or truck is built up of joist channel and angle sections, and is arranged to run under the bottom booms of the stiffening girders. It is furnished with 60 cast-steel wheels. From the frame is suspended the car, 33 feet in length by 40 feet in width, which is divided into a central roadway space and two footways. The frame and car are propelled by steel-wire ropes wound on a drum worked by electric motors, and the maximum rate of travel is 10 feet per second. The cost of the bridge was about £70,000.

The common use of railway motor-cars (paper by Messrs. Riches and Haslam) caused much comment, favorable and otherwise. They are suitable for sparsely settled districts, where the heavy cost of electrical installation is prohibitory.

RAPID PROGRESS

AND INTERESTING HISTORY ARE RECALLED

By Connellsville's Centennial Celebration.—Many Thousands Participate and Enjoy the Festivities.

Connellsville has held its centennial celebration. The fact that this Fayette county, Pa., city is 100 years old is nothing out of the ordinary as there are scores of cities and towns that date farther back into history, but Connellsville is of particular interest to the iron and steel interests of the country on account of its geographical location, the very heart of the coking coal region of the world. The history and development of Connellsville has been step in step with the history of the coke industry in the United States, and while the city at the present time has a population of less than 20,000 people, the annual commercial tonnage originating in the region of which is the center is nearly as great as that of any producing point on the continent. About 75 per cent of the coke produced in the United States is made in Pennsylvania, in Westmoreland and Fayette counties.

Incorporated in 1806.

The first coke, so far as can be learned, was made in 1831, by Lester Norton, at a point now within the borough limits of Connellsville. The village was incorporated in 1806 when it had a population of less than 400 and it was to celebrate the centennial of this event that the entire coke region turned out on Aug. 14, 15, 16 and 17. The city was gaily decorated and the Merchants' Association, an extremely healthy and progressive body of men, made an excellent showing. It is estimated that each day of the festivities attracted 20,000 visitors.

The feature of the decorations was an immense coal and coke arch, erected at "Brimstone" corner, the center of the city, by the H. C. Frick Coke Co. A daily parade typical of the industrial growth of Connellsville, speeches by leading citizens of the district and elsewhere, together with several imported metropolitan attractions were the leading features and family reunions were held in every direction. After the Merchants' day parade the townspeople and visitors were the guests of the Centennial committee at Hogg's grove, where, after an ox roast was indulged in speakers told of the past and pre-

dicted the future of the hustling little city.

Early Coke Making.

The early history of coke making in the United States is enveloped in considerable doubt. It is claimed that coke was used in this country in the manufacture of pig iron a few years before the Revolution. While this is possible, it is not probable that coke was used in this country at so early a date. It was not until 1735 that coke was successfully used in England and it did not come into anything like general use in that country as a blast furnace fuel until 1750. In 1816 and 1817, Isaac Mason built the first rolling mill erected west of the Allegheny mountains, to manufacture iron at Plumsock, Fayette county, Pa. This mill went into operation in September, 1817, and coke was used in the refinery.

COKE ARCH AT CONNELLSVILLE CELEBRATION.

CROWD AT OX-ROAST AT CONNELLSVILLE CELEBRATION.

The first coke made in Fayette county, now the heart of the coke region of the United States, was made by Lester Norton in 1831, at a place now within the Connellsville borough limits. In 1837 F. H. Oliphant made coke at his Fairchance furnace, near Uniontown, Pa., and from 1836 to 1839 other attempts were made to use coke in Pennsylvania furnaces without success. In 1849 there was not a coke furnace in blast in Pennsylvania but by 1856 there were 21 in Pennsylvania and three in Maryland using coke. None of these, however, were using Connellsville coke and it was not until the development of the Connellsville region that its use as a blast furnace fuel came into favor, or the manufacture of coke itself in this country assumed any importance.

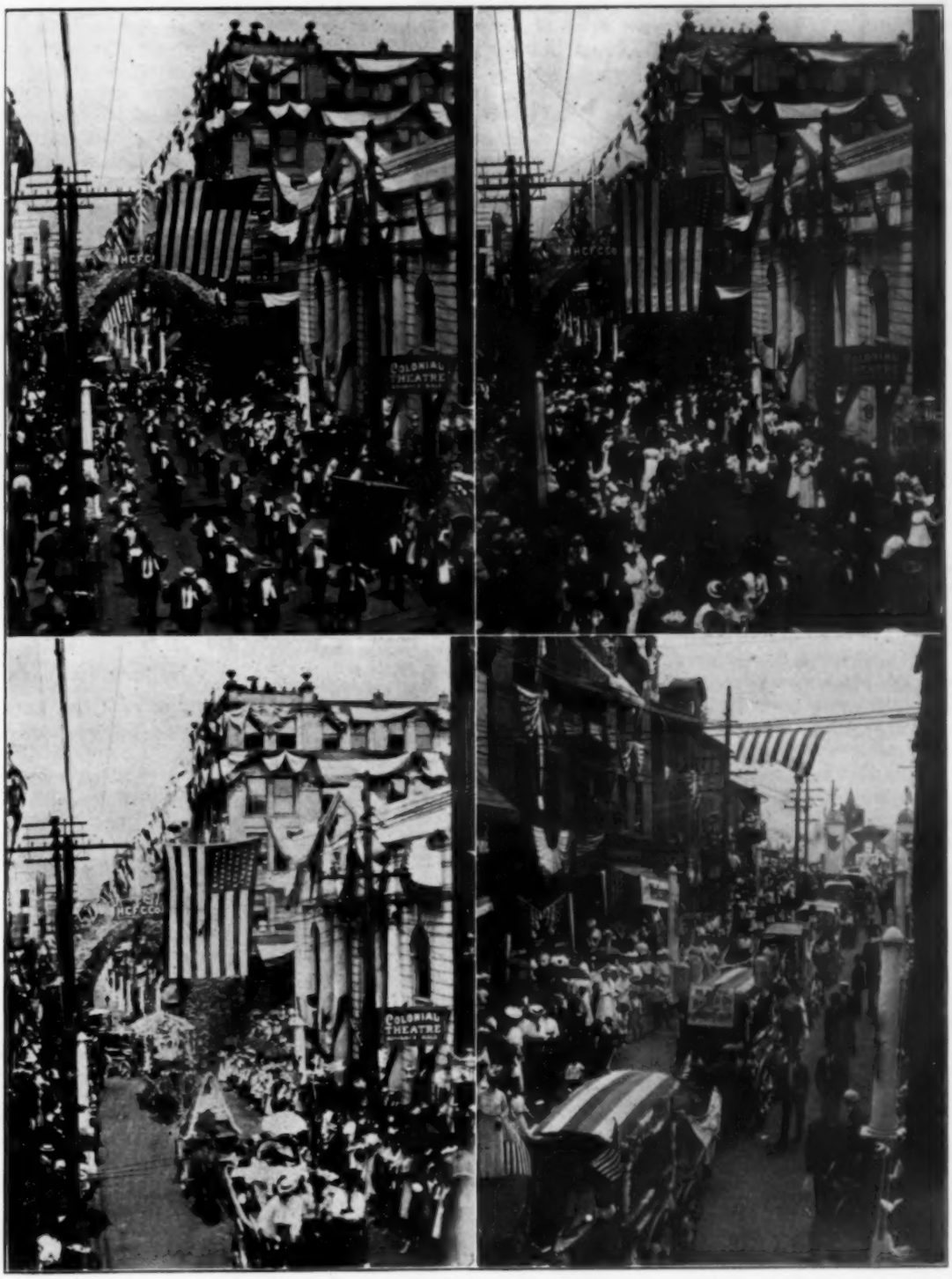
Some Pioneer Difficulties.

All the early coke was made in the ground. The first made in ovens was the Lester Norton enterprise in 1831 and this example was followed in 1841, ten years later, when Provance McCormick and James Campbell, two carpenters, and John Taylor, a stone mason, owners of a farm on the Youghiogheny river, and operating a coal mine in a small way, commenced making coke in two ovens. By the spring of 1842 they had enough coke to fill two boats, about 800 tons. Campbell and McCormick built a boat and on a high stage of water took this down the Youghiogheny, Monongahela and Ohio rivers to Cincinnati.

On reaching that city they discovered the demand for coke was not as brisk as they had hoped to find it. The new fuel was unknown there; foundrymen regarded it with suspicion, calling it "cinder." Campbell, who went with the boats, remained at the landing three weeks, retailing out of one boat load in small lots at eight cents per bushel. He traded the remainder to Miles Greenwood, a Cincinnati foundryman, for a patent iron grist mill which he took to Connellsville and when he put it into operation found it to be a failure, selling it for $30, and so ending the first

MAIN STREET, CONNELLSVILLE, LOOKING EAST.

coke manufacturing firm in the Connellsville region. A part of the cargo that had been traded for the grist mill was afterward floated by canal to Dayton, O., and there sold to Judge Bebhart, a former resident of Pennsylvania, who then operated a foundry at Dayton. He used the coke in his establishment and found it so well adapted for his purpose that he soon after went to Connellsville and proposed to Campbell and McCormick to take more. But they had had enough of the coke trade to satisfy them in their previous venture.



GREENSBURG BUSINESS MEN IN PARADE.
INDUSTRIAL FLOATS IN PARADE.

CROWDS ON STREETS OF CONNELLSVILLE.
UNION SUPPLY CO. WAGONS.

All Boated to Cincinnati.

In 1843 the ovens built by Taylor and used by Campbell and McCormick were rented to James and Sample Cochran who used them in making 24-hour coke. When they had coked about 1,300 bushels it was boated to Cincinnati and sold to Miles Greenwood, who, in the meantime had become acquainted with the value of coke as a fuel.

In 1850, or thereabout, three or four

ovens were built and put in operation by Stewart Strickler, the product being boated to Cincinnati and sold. For some years but little coke was made, though a few ovens were built and that knowledge acquired which was necessary for the coming development of the trade. The industry increased somewhat in 1851, though in 1855 there were but 26 ovens above Pittsburg. It was not until the B. & O. railroad was completed to Pittsburg and Connellsville coke had been successfully used in the Clinton Furnace at Pittsburg, that its value as furnace fuel was fully demonstrated and the foundation laid for the demand which has resulted in the unprecedented development of coke manufacture in the Connellsville coke region.

Connellsville's Entry.

The Clinton furnace was blown in in 1859 to make pig iron from coke. This was first manufactured from Pittsburg coal near the furnace. It was made about three months, when, the coke proving unsatisfactory, the furnace was blown out and arrangements were completed to secure a supply from the Connellsville region. In the spring of 1860 the furnace was again blown in, using coke from the Fayette Coke Works, comprising about 30 ovens which were also built that year. Forty ovens were built at Hickman Run in 1864. The product of these ovens was transported on runways to the Pittsburg & Connellsville railroad until 1871, when the Hickman run branch of the railroad was built. In 1860 the Connellsville Gas, Coal & Coke Co., was organized and 40 ovens were built near Connellsville and in 1869 forty were built near Dunbar, Pa. These were about all the works in the region up to 1871.

The United States census report of 1850 shows that there were but four establishments making coke in the United States at that time, but this report is probably not correct.

In 1871 the Mt. Pleasant & Broad Ford road, of which H. C. Frick was one of the projectors, was built and opened up the northern ends of the coke region and inaugurated the construction of several plants. In 1871 Mr. Frick and his associates, under the firm name of Frick & Co., started into the coke business with 300 acres of land and 50 ovens known as the Frick works. In 1872 the Mt. Braddock, Jimtown and Valley works were built and about the same time Frick & Co. added 50 ovens to the Frick plant and built the Henry Clay works of 100 ovens on the Youghiogheny river near Broad Ford.

Spread of Oven Building.

Oven building continued until the total in 1873 was 3,673. In this year the great financial panic occurred and the iron business began to decline; the price of coke dropping in sympathy until in 1879 came the unprecedented demand and prices which had previously ranged for several years from 90c to $1.15 per net ton at ovens advanced to $5. This boom naturally gave impetus to the coke trade and in 1880 there were over 7,000 ovens in the region. The business continued with varying activity and the following table will give an idea of the enormous growth of the business from 1880 to the present time:

Year.	Total Ovens.	Tons Shipped.	Av. Price.	Gross Revenue.
1880	7,211	2,205,946	$1.79	$3,948,643
1881	8,208	2,639,002	1.63	4,301,573
1882	9,283	3,043,394	1.47	4,473,889
1883	10,176	3,552,402	1.14	4,049,738
1884	10,543	3,192,105	1.13	3,607,078
1885	10,471	3,096,012	1.22	3,777,134
1886	10,952	4,180,521	1.36	5,701,086
1887	11,923	4,146,989	1.79	7,437,669
1888	13,975	4,955,553	1.19	5,884,081
1889	14,458	5,930,428	1.34	7,974,663
1890	16,020	6,464,156	1.94	12,537,370
1891	17,204	4,760,665	1.87	8,903,454
1892	17,256	6,329,452	1.83	11,598,407
1893	17,513	4,805,623	1.49	7,141,031
1894	17,834	5,454,451	1.00	5,454,451
1895	17,947	8,244,438	1.23	10,140,658
1896	18,351	5,411,602	1.90	10,282,043
1897	18,628	6,915,052	1.65	11,409,835
1898	18,643	8,460,112	1.55	13,113,179
1899	19,689	10,129,764	2.00	20,259,528
1900	20,954	10,166,234	2.70	27,448,832
1901	21,575	12,609,949	1.95	24,589,400
1902	26,329	14,138,740	2.37	33,508,714
1903	28,092	13,345,230	3.00	40,035,906
1904	29,119	12,427,468	1.75	21,748,069
1905	30,842	17,896,526	2.26	40,446,149

In addition to the above table new developments are being made constantly in the Connellsville region and at the present time several companies are building ovens in plants from 50 to 600 ovens which will be producers before the end of the year.

Early Connellsville History.

Now for a word about Connellsville itself, which, while it is the heart of the coking coal region, has a strong rival in Uniontown, another progressive and active city but a few miles away.

The first settler within the limits of the present Connellsville was William McCormick, who came from Winchester, Pa., about 1770. He had a number of pack horses and with them engaged in the transportation of salt and iron from Cumberland, Md., to the Youghiogheny and Monongahela rivers. Col. William Crawford, the hero of Connellsville, killed by the Indians in later life, settled on the west side of the Youghiogheny river, where New Haven is now located, in 1767. Zachariah Connell, the founder of Connellsville, settled about 1770 and made his home with Col. Crawford, whose son-in-law he became in 1773. He lived on the west side of the river but later, (1773 to 1778), the exact date not being known, he moved to the east side on land now included in the present site of Connellsville. He died Aug. 26, 1813, age 72 years. In 1793 the town of Connellsville was laid out and chartered by Mr. Connell, and 13 years later was incorporated.

For many years after the incorporation of the borough of Connellsville, the town was little more than a frontier settlement, little attention being paid to improvements. Upon the development of the mineral resources surrounding Connellsville, the town rapidly rounded itself into a business center of considerable importance. Year after year the developments increased; coke plants sprang into existence and manufactures became greater. The coke industry increased rapidly and made for Connellsville a name that is familiar with every manufacturer using coke in the United States.

Its First Railroad.

The first railroad into Connellsville, the Pittsburg & Connellsville railroad (now the Baltimore & Ohio), was chartered in 1837, but many obstacles were encountered by the company in its construction that it was not until 1855 that the road was open for travel between Connellsville and West Newton. The Fayette County railroad, now the Fairmont & Pittsburg division of the Baltimore & Ohio, extending at that time from this place to Uniontown, was opened for travel on Jan. 1, 1860. In 1871 the Baltimore & Ohio railroad completed its tracks from Baltimore to Connellsville, and in 1875 the lines of the Pittsburg & Connellsville and the Fayette County railroads were leased to the B. & O., which company now operates them. The Pennsylvania railroad entered Connellsville and the coke region in 1875 and the Pittsburg & Lake Erie railroad completed its system from Pittsburg to New Haven in 1884. During the last twenty years branches of these railways have been built into every section of Fayette county. Increasing traffic has compelled them to build double tracks, the Baltimore & Ohio operating a double track system almost all the way between Chicago and Baltimore. The Pennsylvania and P. & L. E., also operate

double track systems. From the terminus of the Pittsburg & Connellsville railroad in 1855, Connellsville has grown to be the most important railroad center on the Baltimore & Ohio railroad, with freight yards handling a very large proportion of the coal and coke shipped out of the Connellsville region.

Features of Centennial.

The Connellsville Centennial, as announced in THE IRON TRADE REVIEW last week, started Tuesday morning, Aug. 14, when Gov. Pennypacker, of Pennsylvania, from the state capitol at Harrisburg, pushed an electric button which was the signal for the blowing of whistles, ringing of bells, firing of salutes and unfurling of flags which declared the opening of festivities. Each morning the same program was followed, with the exception of the part taken by the governor, the first day.

President Thos. Lynch, of the H. C. Frick Coke Co., the progress and history of which is practically the history of the coke region, was present during the greater part of the centennial and assisted the local committees, contributing the immense coke arch that stood as a monument to the industry of the region. During the course of the celebration Ex-United States Senator George L. Wellington, of Maryland; Gen. W. H. Koontz, of Somerset county, Pa.; Col. A. D. Boyd, B. P. Wallace, of the Business Men's Association; Jas. W. Wardrop, of the Merchants' & Manufacturers' Association, Pittsburg; Hon. A. F. Cooper, Uniontown; Joseph Moreland, Morgantown; and George M. Hosack, Pittsburg, spoke on the past and future of Connellsville.

It is estimated that 20,000 visitors were present each day and Greensburg, Uniontown, Scottdale and surrounding towns contributed liberally to the attendance. The two features of the parade of more than local interest were the 53 wagons of the Union Supply Co., a Frick interest in the coke region and a 100-horse team of the Frick Coke Co.

Will Raise Valuation.—The valuation of the mining properties in St. Louis county for taxation purposes is to be raised. This will include all the mines in the Mesabi and Vermillion ranges. Just what the total valuation will be has not been figured out by the county auditor as yet though the rating has been fixed. Two years ago the valuation was raised from $22,000,000 to $42,000,000 and an increase of 75 per cent has been proposed, which would make the figure $73,500,000.

BUSY DAYS

FOR MANY OPERATORS ON THE OLD RANGES.

Excellent Progress at the American.—Progressive Cleveland-Cliffs Policy.—Other Properties.

(Special Correspondence.)

Ishpeming, Mich., Aug. 20.—The recent transfer of the lease of the famous section 30 tract—a Vermillion range property in litigation nearly a score of years before the supreme court of the United States finally decided the title to rest with the present fee owners—was one of the most important deals involving Lake Superior iron ore holdings negotiated in recent years. Control of the property is now in the hands of the Midland Steel Co., of Pittsburg. Section 30 has been in course of exploration and development the past year by the Shagawa Mining Co., which is composed of A. M. Chisholm, Edward Lynch and D. M. Philbin of Duluth, and the showing to date is such as to lead to the conclusion that the Shagawa will open into a very large and valuable mine, producing as high grade ore as mined anywhere in the region. The tract is owned in fee by George Lonstorf of Milwaukee, and Lon Merritt, R. H. Fagan and F. W. Eaton of Duluth. This deal is said to be the first negotiated in the Lake Superior country by the Midland people, but it is understood negotiations are in progress whereby other properties will be taken over by this newly organized independent concern.

Reopening the American.

Under the superintendency of Capt. Frank Platto of Ishpeming, excellent progress is being made with the task of reopening the old American mine, an old-time property on the western Marquette range which was shut down a dozen years ago. The work was started last winter. Underground there has been a considerable settling of ground despite the hard hematite formation, while on the surface there was not a building in habitable condition. A large boarding house is now in process of construction, and with a few dwellings now available will furnish adequate accommodations for the men, some of whom are forced to live at the Dexter location, a mile distant. The spur track has been relaid to the mine, and supplies are now received over it. Probably 5,000 tons of ore, taken out in the course of the development work, will be shipped this season, and it is hoped to open sufficient ground during the winter to make a creditable showing next year. The mine is being re-opened by the Cleveland firm of M. A. Hanna & Co.

The American is certainly in line with the Marquette hard ore range. This is the opinion of former Commissioner of Mineral Statistics G. A. Newett, and is borne out by the topography of the district. To the east the smoke of the Ishpeming properties can be seen, while nearer the location the smokestack of the Dexter appears in plain view. Westward the stacks of the Champion mine are plainly visible. In point of quality the mine has produced some of the best ores ever shipped from the range, although, with a persistent seam of soapstone cutting through the vein, much care in mining is necessary. The principal work now in progress is shaft sinking, the ore above the present bottom level having been robbed out when the property was last worked. The shaft is going down in ore, the vein showing a thickness of 10 to 12 feet, the appearance of the ground being much better than it was expected would be found. The vein has always been a regular one, easily followed. The ore is pitching under a swamp to the west of the shaft, and it is in this direction that the hope of better things lies, as proved to be the case at the Champion. On the level next to the lowest a drift is being pushed to the northwest. This is now in soft ground, and it is believed that soft hematite will eventually be opened in this portion of the property.

Hartford's New Equipment.

The Hartford mine, a Negaunee property of the Oliver Iron Mining Co., is now provided with a complete underground haulage system and lighting plant. The tramming was formerly done with mules, but this service has been unsatisfactory because of the considerable distance necessary to cover in getting the ore to the shaft. The limit of production has been reached, in fact, now, with electricity doing the work, it will be possible to increase the output, which means that more men will be employed. The Hartford has developed into a splendid mine, and it is finely equipped with new machinery. A new engine and boiler house is in commission, and before winter sets in a combination office and warehouse building and a changing house adequate for 300 miners will have been erected. The Hartford last year produced 336,850 tons of ore. The product is a soft hematite running 56 to 60 per cent in metallic iron, and both Bes-

semer and non-Bessemer grades are produced.

The Oliver company is doing considerable building at other of its Marquette range mines. A big division machine shop has lately gone into commission at Ishpeming; a new boiler house is to go up at the Section 16 mine, and shop buildings and a changing house at the Stegmiller at Princeton. Three large tubular boilers will replace the present battery of four at the Section 16. At this property, the ore crusher is again in commission after having been idle since last season, and with the No. 2 plant, at which the hard ores of the Lake Superior properties are screened, it will be continued in operation throughout the summer season, orders having been received to increase the shipments. Work at the Stegmiller, which is in the district to the south of Negaunee, was started about two months ago. It took but a short time to unwater the old workings, as they are not extensive, and about a fortnight ago the first ore was hoisted. The mine is located close to the Princeton property of the Cleveland-Cliffs company; in fact, the shaft lies between the two Princeton shafts, only about 300 feet from one of them. It is believed the Stegmiller will be developed into a fair-sized producer. With the completion of the various buildings contracted for the working force will be increased.

New Cable System.

At the close of the shipping season, the M. A. Hanna Consumers' Ore Co. will start work on the installation of a cable system for tramming the ore to the crusher from the open pit at its Richmond mine, in the Cascade district, south of Negaunee. The tramming is now done by mules. The present method is not only slow, but the output is not large enough to keep the crusher in constant operation, nor is it possible to increase to any extent the tonnage now handled, as the haul, already a thousand feet, is gradually getting longer. It will require upwards of 2,000 feet of cable to make the complete circuit. Two cars will be operated, the loaded one going out as the empty car returns to the pit. About 100 men are now employed at the Richmond, and an average of thirty cars of ore are being shipped daily. There is an extensive ore body, and the open pit is one of the largest on any of the Michigan ranges. It has been opened about 600 feet in length, 300 to 400 feet in width, and its depth at the back is 60 feet. The deposit has been tested for a width of 1,100 feet, and it extends across the forty. Its depth has not been determined. Only a few feet of stripping is necessary to uncover the ore, which is of a hard variety, assaying about 45 per cent in iron. It is expected that next season the Richmond will employ a larger force and send out a larger output than ever. About 200,000 tons will be shipped and two steam shovels operated in mining the ore.

The Empire Mine.

The Empire mine, also in the Cascade district, has a deposit very similar in appearance and quality to that at the Richmond, but the property is to be worked on the underground plan, winning the greater part of the ore by the milling system, which, perhaps, is as practical as any in vogue. The ore body runs about 45 per cent iron, and looks distinctly promising. The overburden is but four feet in depth at the points at which it has been tested. The deposit has been proved up 800 feet in width, and in length it extends across the entire property. The shaft, a fine one, 6 by 12 feet, and three compartments, is down 115 feet. Winzes are to be put in, extending across the deposit, and in line with the first drift, which is being extended from the bottom of the shaft. The milling will not be well in hand until two or three winzes are completed. The property will be operated throughout the winter. Cross-cuts will be opened and preparations made for increasing output. The Empire is being developed by John T. Jones, of Iron Mountain, and associates. A spur track is being extended to the mine by the Chicago & Northwestern company.

A Lively Mining Town.

Princeton, south of Negaunee, where the Cleveland Cliffs Iron Co. is operating three mines, the Austin, Princeton and Stephenson, and the Steel Corporation the Stegmiller, is one of the liveliest mining locations in the Lake Superior region. Both companies are making extensive preparations for further development of the mines by the erection of new and substantial buildings, the installation of more powerful and economical machinery and the systematic opening of the ore deposits. All told, 700 men are now employed. The Cleveland Cliffs company has an ideal location for its workmen. The dwelling houses are supplied with many conveniences not usually found at mining locations, the streets are well built and well kept, and the grounds surrounding the homes are attractive. The Steel Corporation is erecting a number of buildings at the Stegmiller, and half a dozen or more new structures are to go up at the Cleveland Cliffs properties. The foundation for a modern changing house is finished, and the superstructure will be completed within two months. A large central power station is to be erected this fall at the Stephenson, a contract for which has just been awarded. The building will be of brick and stone, the engine room 59 by 34 and the boiler house 48 by 34. In the engine department will be located the air compressor and electric lighting plant, the hoisting being done as now by individual plants at the various shafts. Three 250-horsepower boilers will be installed in the boiler room. They will be equipped with mechanical stokers, economizers and induced draft.

At least six diamond drills are in operation in the Swanzey district proving up ground for the Cleveland Cliffs company. Nearly all the machines are working within three miles to the west of the Little Lake railroad station, although the zone of operations is by no means confined to this small area. The result of the explorations will not be known until actual development begins, but it is intimated that a number of important ore bodies have been located and that several mines will be opened that will eventually prove as rich as either the Princeton or Austin properties. The indications of iron ore are very strong in the Little Lake district; in fact, farmers and others living in the settlement find it difficult to get suitable drinking water owing to the presence of iron. It is reported at Negaunee that ore has been found on the farm of Sol. Powell, at Sands, where a drill has been in commission for some time past.

The new ore crusher being installed at the South Jackson mine at Negaunee will be operated almost continuously during the shipping seasons, as ores from a number of the mines of the Cleveland Cliffs company are to be treated there. Perhaps the first ore to go through the crusher will be mined at the North Jackson open pit, which is soon to go into operation. Some 30,000 tons will be mined there this year. There is an immense body of low grade ore at the South Jackson alongside the crusher plant, but it is not likely that any great quantity will be mined during the next few years, as it cannot be used to advantage at this time. It is planned to crush ore at the South Jackson plant from both the Cliffs shaft and Moro properties, located at Ishpeming. The crusher at the Cliffs shafts is now working to its capacity, and much of the ore hoisted cannot be treated.

The Muncie plant of the American Sheet & Tinplate Co. resumed operations Aug. 20.

Railroad Developments Market Feature.

Railroad developments of startling proportions proved the dominating feature on the stock exchanges of the past week. These include the raising of the Union Pacific common stock to a 10 per cent basis, the declaration of an initial dividend of 2½ per cent semi-annually on the common stock of the Southern Pacific, the allotment of $25,000,000 common stock at par by the St. Paul, representing valuable subscription rights, the calling of a special stockholders' meeting to authorize the doubling of the capital stock of the Chicago & Northwestern and the announcement by the Norfolk & Western of a contemplated increase in capitalization from $66,000,000 to $100,000,000 and of an issue of $34,000,000 convertible bonds. Not for years had the street met with so many sensations in one week's time. Any single item of those listed would ordinarily have supplied the market with its due share of stimulus. As it was, the aggregate was too overwhelming to be given proper consideration and developments other than the two unexpected actions in the Pacific stocks were virtually ignored. Southern Pacific sold to the extent of 814,300 shares, netting a gain of 12⅞ points for the week, while 915,900 shares of Union Pacific changed hands and the security closed the week at 184¼, a net gain of 26¾ points. The latter is now on a 6 per cent basis as regards its own earnings and a 4 per cent basis as regards its investments. The action of these two roads is likely to prove revolutionary, it having long been held by western interests that 7 per cent should be the maximum for common stock, as a heavier rate would tend to foster rival lines and provoke hostile legislation. The method of announcing the Pacific developments excited wide criticism. Total trading for the week was 7,531,730 shares, to which the two-hour session of Saturday contributed 1,633,500, making it the heaviest Saturday's business on record. The market closed excited and bouyant with net gains in almost the entire list of iron, steel and industrial securities. Steel common continued its remarkable rally, ending the week at 45⅛, and Colorado Fuel and International Pump were large gainers. The South American earthquake furnished the only unfavorable news factor of the week.

THE LEADING INDUSTRIAL SECURITIES.

	Closing Quo. Aug. 11	Closing Quotation Aug 18.	Changes	Date of 1906 Ann. Meet.	Par Value	Capital Outstanding	Dividend		
							Basis	Being Paid	Date Last Div. Pay.
Allis-Chalmers Co	16½	18	+1⅛	Sept.	100	19,820,000			
Allis-Chalmers preferred	45	48¼	+3¼		100	16,150,000	7 cum	.....	Feb., 1904
American Can	7⅛	7⅜	+ ⅜	Apr. 24	100	41,233,300			
American Can preferred	57⅜	59½	+1⅜		100	41,233,300	7 cum	5 Q.	July, 1906
American Car and Foundry	38½	41¼	+2¾	June 28	100	30,000,000			May, 1905
AmericanCar and Foundry preferred	100½	101	+ ½		100	30,000,000	7 n. c.	7 Q.	July, 1906
American Locomotive	69	70¼	+1¼	Oct. 16	100	25,000,000		1¼	July, 1906
American Locomotive preferred	113	113	.....		100	24,100,000	7 cum	7 Q.	July, 1906
American Shipbuilding	65½	64⅛	−1	Oct. 2	100	7,600,000	4 n. c.	1 Q.	Aug. 1906
American Shipbuilding preferred	107¼	107	− ¼		100	7,900,000	7 n. c.	1¾ Q.	Aug. 1906
American Steel Foundries	10¾	10¾	+ ⅛	Oct. 3	100	17,700,000		.....	
American Steel Foundries preferred	44	45½	+1½		100	17,700,000	6 cum	.....	Aug.,1905
Barney & Smith	65	70¾	+5¾	June 5	100	1,000,000	4	4	Sept.,1906
Barney & Smith preferred	140	140	.....		100	2,500,000	8 cum	8 Q.	Sept.,1906
Bethlehem Steel	21	22	+1	April 3	100	15,000,000		.....	
Bethlehem Steel preferred	85	85	.....		100	15,000,000	7 n. c.	7 Q.	Aug.,1906
Bullock Electric preferred	111	112	+1	Oct. 2	100	1,000,000	6	6 Q.	July, 1906
Cambria Steel	34	35¼	+1¼	March 20	50	45,000,000	6	3 Q.	Aug., 1906
Cambria Iron	49½	49	− ½		50	8,468,000	4	4 S. A.	Apr., 1906
Colorado Fuel & Iron	53⅜	57⅞	+3⅞	Oct. 15	100	30,132,000	7	.....	Apr., 1902
Wm. Cramp & Sons Ship & Eng. Bldg. Co.	18	15	−3	May 31	100	6,098,000	5	.....	Nov.,1902
Crucible Steel	12¾	12⅞	+ ⅛	Oct. 17	100	25,000,000		.....	
Crucible Steel preferred	77⅞	80	+2⅛		100	25,000,000	7 cum	.....	June,1906
Empire Steel	7	4	−3	Feb. 28	100	2,281,400		.....	
Empire Steel preferred	38	35	−3		100	2,500,000	6 cum	3 S. A.	July, 1906
Fay & Egan	100	95	−5	Feb. 20	100	1,000,000	6	6 Q.	May, 1906
Fay & Egan preferred	128½	128½	.....		100	1,000,000	7 cum	7 Q.	May, 1906
General Electric	167	170¾	+3¾	May 8	100	48,256,050	8	8 Q.	July, 1906
International Pump	44½	52⅝	+7⅛	June 5	100	12,262,500		2	July, 1905
International Pump preferred	84½	86	+1½		100	8,850,000	6 cum	6 Q.	Aug., 1906
Lackawanna Steel	72	71	−1	March 14	100	34,971,400		.....	
Lake Superior Corporation	18	17½	− ½	Oct. 3	100	40,000,000		.....	
Niles-Bement-Pond	130	130	.....	Feb. 7	100	5,000,000	6	6 Q.	Sept, 1906
Niles-Bement-Pond preferred	105	105	.....		100	2,000,000	6 cum	6 Q.	Aug., 1906
Otis Elevator Co	51¼	50	−1⅛	March 19	100	6,350,300		2 A.	Apr., 1906
Otis Elevator Co. preferred	98	98	.....		100	5,589,500	6 n. c.	6 Q.	July, 1906
Pittsburg Coal Co	15	15	.....	Feb. 12	100	30,135,000			
Pittsburg Coal preferred	53½	54⅜	+ ⅜		100	30,716,200	7	.....	Apr., 1905
Pressed Steel Car	51⅞	54⅛	+2⅛	Feb. 21	100	12,500,000		3	Aug., 1904
Pressed Steel Car preferred	97½	98½	+1		100	12,500,000	7 n. c.	7 Q.	Aug., 1906
Pullman Palace Car	238	239¾	+1¾	Oct. 18	100	74,000,000		8 Q.	Aug., 1906
Railway Steel Spring	52½	54¼	+1¾	March 1	100	13,500,000		4 S. A.	Oct., 1905
Railway Steel Spring preferred	98½	100⅜	+1⅞		100	13,500,000	7 cum	7 Q.	June, 1906
Republic Iron & Steel	28	30¼	+2¼	Oct. 17	100	27,352,000		.....	
Republic Iron & Steel preferred	99	101	+2		100	20,852,000	7 cum	7 Q.	Apr., 1906
Sloss-Sheffield	76⅝	78	+1⅜	March 14	100	7,500,000	5	5	Jan., 1906
Sloss-Sheffield preferred	106	106	.....		100	6,700,000	7 n. c.	7 Q.	July, 1906
Tennessee Coal & Iron	154	160	+6	May 15	100	22,552,800		4 Q.	Aug., 1906
U. S. Cast Iron Pipe & Foundry	47¼	46¾	− ½	June 27	100	12,500,000		2	Sept.,1906
U. S. Cast Iron Pipe & Foundry preferred	90¼	90¼	.....		100	12,500,000	7 n. c.	7	Sept.,1906
U. S. Steel	40⅜	45⅛	+4¼	April 16	100	508,302,500	2 n. c.	½ Q.	Oct., 1906
U. S. Steel preferred	106	108	+2		100	360,281,100	7 cum	7 Q.	Aug , 1906
U. S. Steel 5's	98⅛	98⅛	.....		100	463,796,000	5	5 A.	
Virginia Iron, Coal & Coke	45	45⅛	+⅛	Sept. 18	100	8,641,600		.....	
Westinghouse Electric	150	155	+5	June 27	50	20,996,350	10	10 Q.	July, 1906
Westinghouse Air Brake	145	145	.....	Oct. 2	50	10,990,450	20	20 Q.	July, 1906

The Barney & Smith Car Co. has declared the regular quarterly dividend of 2 per cent on preferred, payable Sept. 1. Common dividends at the rate of 1 per cent quarterly will be resumed, the first being payable Sept. 15.

Passaic Steel Co. creditors have received notice of another dividend of 5 per cent, making a total of 75 per cent so far declared. The total indebtedness was about $500,000.

NEWS FROM MANY INDUSTRIES.

New Buyers:—

• The Cleveland Coal & Coke Co., Roanoke, Va., has been incorporated with a capitalization of $25,000 to conduct a general mining business. The incorporators are: D. C. Hoffman, Jefferson Tennant, Jasper Taylor, Hanson Bennett, Frank Taylor and C. Woodford, of Morgantown.

The Atlanta Plow Co., Atlanta, Ga., has been organized with a capital stock of $50,000 by J. W. Hightower, J. B. Hightower, G. W. Brown and S. J. Brantley.

The Southern Farm Tool Co., Atlanta, Ga., has been incorporated with a capitalization of $10,000, and privilege to increase to $50,000. The incorporators are: W. J. Stapler, John P. Keeden and T. H. Williams.

The Logan Repair & Machine Shops, Logan, W. Va., has been chartered by W. F. Farley, of Holden; U. B. Buskirk, S. B. Robertson, J. Carey Alderson, T. E. Maloney, C. V. White and W. T. Farley, of Logan.

The Woburn Gear Works, 36 Nashua street, Woburn, Mass., has been incorporated by H. W. Warren, E. H. Warren and E. C. Warren to do small and medium work at present, but later expects to add larger sizes.

The Grupe Drier & Boiler Co., Davenport, Ia., has been incorporated with a capital of $50,000 to manufacture and deal in driers and boilers and to do general structural and plate iron and steel work. The incorporators are: D. Grupe, John Grupe and Rinehard Bojens.

The Automatic Machine & Die Works, Ottumwa, Ia., has been organized for the purpose of building automatic machines, forming and cutting dies and perfecting patents. The incorporators are: Dr. W. E. Creath, L. P. Eisenbeis and T. M. Avery. The new concern has already booked orders for five or six months ahead.

The Svenson Engineering Co., Pittsburg, Pa., has been organized by W. W. Darley, John Svenson, Frank L. Phillips, S. R. Ireland and E. J. Kent to design, erect and equip manufacturing and industrial plants, mills, machinery, engines, etc.

The Perth Bolt & Forging Co., Ltd., Perth, Ont., has been incorporated with a capitalization of $50,000 with John A. Stewart, Adelbert E. Hanna, Andrew W. Dwyre, William B. Hart, Michael Drennan, Joseph Mendell and George R. Rogers as provisional directors.

The Watervliet Foundry & Machine Co., Watervliet, N. Y., foundry and machine shop, has been incorporated with a capital stock of $60,000. The incorporators are. Harry R. Kelly, George B. Kelly, Troy, N. Y.; Michael Foley and John V. Hemstreet, Herkimer, N. Y.

The Multi Scale Co., Ltd., Guelph, Ont., has been organized with a capital of $40,000 with Herbert Wright, Geo. Henderson, David Anderson, Daniel Bailey, William Wright and George Taylor as provisional directors.

The Rochelle Wire Mfg. Co., Rochelle, Ill., has been incorporated with a capitalization of $50,000 by Peter Hohenadel and George E. Stocking.

The Fairmont Foundry Co., Hickman's Run, near Fairmont, W. Va., has been incorporated with a capitalization of $25,000 to establish a foundry. W. Devries Goodwin, of Maryland, is president.

The Wright Automatic Safety Air-Brake Attachment Co., Greensboro, N. C., has been chartered with an authorized capital of $40,000 by C. E. Holton, F. P. Hobgood Jr. and J. T. Battle.

The Quaker City Iron Works, Philadelphia, has been incorporated with a capitalization of $10,000 by A. Letchworth, 222 Winona avenue, Germantown, Pa., and H. M. League and Robert Mair, Philadelphia.

The Toldevin Machine Co., Brooklyn, has been incorporated to manufacture machinery, boilers, engines, tools, etc. The authorized capital stock is $20,000, and the incorporators are: Lawrence W. Trowbridge, No. 340 Manhattan avenue, New York; Frank W. Toppan, No. 151 West 103d street; Raymond Ballantine, No. 503 West 148th street, New York.

The Grant-Lees Machine Co., Cleveland, O., has been organized with a capitalization of $100,000 by B. M. Henderson, J. B. Muir, Louis Englander and G. O. Welch.

The J. R. Long Wrench Co., Akron, O., has been incorporated with a capital stock of $30,000 by John R. Long, Walter R. Talbot, William A. Bynder, Oliver Sorrick and William M. Webb.

The Marysville Machine Works, Marysville, Yuba county, Cal., has been incorporated with a capitalization of $50,000 to manufacture pumps and mining machinery. The incorporators are: R. C. Purcell, of San Francisco; H. B. P. Carden, of Marysville, and J. R. Henderson, of Oroville.

The Bath Grinder Co., Fitchburg, Mass., has just incorporated its business with a capital stock of $40,000, and Robert D. Gould, of the Fitchburg Hardware Co., has become associated with the former owners. The company has found it necessary to secure larger quarters to take care of its increased business.

The Pittsburg Pole & Forge Co., Pittsburg, has been incorporated to manufacture iron trolley poles, etc., by F. P. Patterson, J. R. D. Huston and W. M. Davis, of Pittsburg.

The Mossman Construction Co., Pittsburg, capital $100,000, has been incorporated by Paul B. Mossman, Paul A. Wiseman and Alfred M. Lee, Oakmont.

The DuBois Iron Works has been chartered in Pennsylvania to operate a plant at DuBois, Pa. John E. DuBois is the chief owner.

The Ellwood City & Beaver Bridge Co., has been incorporated to build a bridge over Big Beaver creek, Beaver county, Pa.

The Buchanan Plow & Implement Co. will manufacture farming implements, machinery, etc. The authorized capital stock is $100,000 and the incorporators are: Edward F. Buchanan, Albert O. Brown, Lewis G. Young, all of No. 30 Broad street, New York.

The Smoke & Syphon Co., of Philadelphia, has been incorporated in Delaware to manufacture and deal in smoke consumers and waste utilizers. The capital stock is $1,000,000, and the incorporators are: Ira H. Karper and Robert W. Kilpatrick, of Philadelphia, and A. P. Stevenson, of Wilmington, Del.

The Automatic Rapid Unloading Co., Boston, has been chartered with a capital stock of $100,000 to unload machinery. The officers of the corporation are: President, Henry S. Potter Jr., 110 State street; treasurer, Bernard M. Wolf, 90 Hanover street, and clerk, Harrison D. Folinsbee, 110 State street, all of Boston, Mass.

The Alabama Ore & Iron Co. has been incorporated with a capital stock of $500,000, to carry on mining operations. The incorporators are: Charles L. Hepburn, 1840 Amsterdam avenue, Robert F. Henry, 122 East Eighty-second street, both of New York, and J. Harry Hull, Nutley, N. J.

The Syracuse Steam Gauge Mfg. Co., chartered with a capital stock of $50,000, will manufacture pressure and vacuum gauges. The incorporators are: Leland Willis, Auburn, N. Y.

Gustave F. E. Meistering, Frank H. Graham and Harry H. Farmer, Syracuse, N. Y.

The Elyria Machine Parts Co., Elyria, O., has increased its capitalization from $10,000 to $100,000.

The Hull Can Co., Cleveland, has been incorporated with a capital stock of $60,000 by Charles E. Dahlke, Ed. H. Dahlke, H. H. Hull, George W. Gender and S. C. Vesey.

The Peter McFarlane & Sons Iron Works Co., Denver, Col., has been organized to manufacture mining and milling machinery. The officers of the company are. George M. McFarlane, vice president; Frederick McFarlane, secretary and treasurer, and John Ramussen, manager.

George E. Blaine and Edward Hill, of Indianapolis, are the inventors of a new cross tie, consisting of two blocks of wood connected with a steel bar, the latter serving as a tie plate to prevent the rails from cutting into the wood and as a gauge bar to keep the rails in exact gauge and prevent spreading. A company has been organized for its manufacture, under the name of the B., H. & B. Combination Tie Co., Indianapolis.

New Construction:—

The Higgins Spring & Axle Co., Racine, Wis., is erecting a new shop building.

Construction work has been begun on the shops of the Grand Trunk system at Battle Creek, Mich., on a site of 15 acres. About a dozen buildings will be erected, and the cost of the plant is estimated at $3,500,000.

The Kansas City Southern railway is planning improvements at its Shreveport, La., shops which will double its present capacity.

The Ralston Steel Car Co., Columbus, O., is extending its main building 300 feet and making large additions on the sides, practically doubling its present capacity.

The Forbes Mfg. Co. is to build a large plant at Hopkinsville, Ky., for the manufacture of wagons. The main building will be 160 x 316 feet.

The Malsby Machinery Co., Atanta, Ga., is to erect a new plant to cost about $12,000.

The new foundry of the Capital Brass Ware Co., Detroit, is practically completed, and will be fully equipped and occupied within the next 30 days. The present capacity will be doubled, 20 furnaces being installed. The company manufactures steam and hot water radiator valves and the Noble electro-magnetic separator and does a general custom business.

Construction work on the furnace to be erected by the Jackson Iron & Steel Co., Jackson, O., is to begin at once. The company has purchased the lands of the Jackson & Muncie Coal Co., controlling over 200 acres of coal and has option on 500 acres more adjacent to its properties. Switching facilities are already provided, and it is hoped to have the furnace in blast before the winter is over. The company is capitalized at $150,000.

John J. Kennedy, Lewiston, Me., is to erect a small foundry.

The contract for an addition to the foundry of Williams, White & Co., Moline, Ill., has been let. A reinforced concrete structure 100 x 125 feet is planned.

Extensive improvements are being made at the plant of the Helmbacher Forge & Rolling Mill Co., Madison, Ill.

The Stanley G. I. Electric Co. has let the contract for a $150,000 factory at Pittsfield, Mass. A reinforced concrete structure 100 x 400 feet, and three stories in height, will be erected.

Work has been resumed on the rebuilding of the Baltimore & Ohio repair shops, Keyser, W. Va., which recently burned.

The Northern Malleable Iron Works, St. Paul, Mo., has secured a site of eight acres upon which it will erect foundry buildings to cost upward of $100,000.

The Griffin Car Wheel Co. has purchased a considerable tract of land in Chicago, and it is reported will erect a factory for the manufacture of railroad supplies.

The Collins-Gunther Mfg. Co., San Antonio, Tex., has prepared plans for new office quarters, sales room, foundry and machine shops. About $50,000 will be expended.

The Holland Furnace Co., Holland, Mich., is erecting a new plant, the main building of which will be 50 x 210 feet.

The new car shops of the Union Pacific Railroad Co., at Omaha, Neb., will include a freight car and coach repair shop 178 x 492 feet, with one wing 342 feet, one story in height, of steel framing and brick curtain wall construction. Directly north of the main car shops will be built a paint, wheel and truck shop served by a 90-foot by 350-foot transfer table. This shop will be 178 x 302 feet. A pattern storage house will also be erected. Definite details as to equipment are not as yet available.

Manzel Bros., Buffalo, N. Y., manufacturers of automatic oil pumps, are erecting a factory building on Babcock street, to manufacture their specialties.

The Atlanta, Birmingham & Atlantic Railroad Co. has begun work on new shops at Fitzgerald, Ga., where the company owns about 200 acres of ground. Preparations are being made for an extensive system of railroad shops, which will include a machine shop, blacksmith shop, round house, power house, storehouse, etc. Some of the machinery has been purchased and is now being installed, and several of the buildings are well under way.

The Connecticut Railway & Lighting Co. is to erect a new repair shop at Waterbury, Conn., one story, 100 x 200 feet, and of brick and steel construction. The company will build an addition to its power plant at Bridgeport, to provide space for a new 1,200-horsepower engine.

The W. P. Taylor Co., successor of Bingham & Taylor, Buffalo, is erecting a new foundry building which will increase the capacity of its plant.

The Kansas City Railway Co. has completed plans for a new system of shops to be located at Pittsburg, Kan., which will include a machine shop, round house, power house, etc. F. Mertsheimer, superintendent of machinery for the road, who has offices at Pittsburg, Kan., is making all arrangements for the machinery equipment.

The Shenandoah Steel Wire Co., recently incorporated, is to erect an extensive plant on a tract of land in the suburb of West Seneca, adjacent to the plant of the Lackawanna Steel Co., and near the new plants of the Buffalo & Susquehanna Iron Co. and the New York State Steel Co. The new company is closely identified with the Iroquois Machine Co., 150 Nassau street, New York, and it will manufacture steel wire, with machines of a new type, designed for drawing the wire by a continuous process.

It is announced that the Fillmore Avenue Foundry & Iron Works has about decided to build a new foundry in some other part of Buffalo. If this plan is worked out the new plant will be operated in addition to the company's present plant and will be a large, modern concern. It is intended that the proposed plant will enable the company to increase its output by from 50 to 75 tons daily. At present an addition is being built to its pattern shop, where about fifteen skilled patternmakers will be employed in addition to the force now at work. The directors of the company expect to have their new plans in a definite form within the next few weeks.

The Buffalo Forge Co. has begun operations in its new plant, employing about 70 men in its foundry. Business, however, is not in full swing, but when

it is, fully 120 men will be employed. It is a modern foundry throughout, of gallery construction. The gallery increases the old floor space fully 50 per cent. The foundry is equipped with an electric traveling crane and an industrial railway. With the company's new equipment work of a heavier class may be handled, although the smaller class of work will be confined to the gallery section.

A new foundry has been opened at Tonawanda, N. Y., in connection with the plant of the Buffalo Steam Pump Works, located in that city. This plant is owned by the Buffalo Forge Co., which also controls the George L. Squires Manufacturing Co.

General Industrial Notes:—

The Colonial Foundry & Machine Co., South Norwalk, Conn., has closed temporarily pending the signing of an agreement with the creditors, but will probably be granted more time to meet its claims. It became embarrassed by the collapse of the United States Foundry & Sales Co., but its assets are double its liabilities.

In order to determine whether or not the railroads have obeyed its recent order, making it compulsory for 75 per cent of cars to be equipped with air brakes, the Interstate Commerce Commission has ordered every railroad to report by Sept. 1 the total number of freight cars owned on Aug. 1, together with the number so equipped.

J. K. Louckel and Robert A. Messler have been appointed receivers of the Reeves Engine Co., Trenton, N. J. Liabilities are placed at $311,000, with assets of $258,000.

Foundrymen of Texas are buying the bulk of the output of the penitentiary furnace at Rusk in order to prevent the iron being worked up in the finished product by convict labor.

Stockholders of the Universal Voting Machine Co., Rock Island, Ill., have filed suit for the appointment of a receiver, charging mismanagement. The company, which recently removed from Bloomington to Rock Island, is capitalized at $300,000.

George Robinsteen and his brother, John Robinsteen, have been sentenced to serve six months in the workhouse and pay fines of $500 on conviction of charges of conspiracy and embezzlement in connection with the Eleanor Iron & Steel Co., Butler, Pa., of which they were officers. An appeal has been taken.

The new machine forging department of the Youngstown Engineering Co. is ready for operation. It will be in charge of E. C. Myer, formerly connected with the Wellman-Seaver-Morgan Co., Cleveland.

Controlling interest in the South Atlantic Car & Mfg. Co., Savannah and Waycross, Ga., has been purchased by Frank H. Durden, F. M. Durden and W. N. Durden. The capacity of both plants will be largely increased.

George C. Bates, of Columbus, Ga., and A. E. Dudley have secured controlling interest of the Torreon Foundry, Torreon, Mex. The latter has been superintendent since its establishment.

The Lozier Motor Co., New York, has purchased the business of the Ball Mfg. Co., Stamford, Conn., manufacturer of gasoline engines and machine tools. The manufacturing facilities of the shops will be increased. Charles P. Ball, who has been the head of the business, will remain as superintendent of the works.

The Isaac Joseph Iron Co., Chicago and Cincinnati, has established a scrap yard at Ninety-third street and Anthony avenue, South Chicago, Ill. The property has a frontage of 1,500 feet and is 180 feet deep. A rail shear and derrick will be installed. The company deals in old material and second-hand machinery.

Arrangements have been completed whereby the control of the United Sheet & Tin Plate Co. is to pass into the hands of Pittsburg, Philadelphia and New York capitalists. The property includes a four-mill tin plant at Marietta, O., a three-mill sheet plant at Newcomerstown, O., and the partially completed plant at Byesville, O., as well as the Tucker Mfg. Co.'s plant at Newark, O. The deal was concluded between W. S. Ravenscroft, president of the company, Pittsburg, and E. Truxall, former general manager of the Continental Iron Co., representing the new group of capitalists.

The Eureka Brass Works, Cincinnati, O., is moving its plant, and is erecting an office and supply house.

The officers of the Perry Iron Co., Erie, Pa., recently organized, are as follows: T. S. Clark, president; M. L. Mozier, secretary and treasurer, and E. H. Williams, vice president and general manager.

The business of the Meriden Brass & Iron Works, Meriden, Conn., will hereafter be conducted under the name of the Meriden Iron & Brass Co., the latter concern having a capitalization of $20,000. At the annual meeting, held recently, the following officers were elected: George Knoth, president; Charles Kincke, secretary and Fred Radtke, treasurer.

Trade Notes:—

The Herron Pump & Foundry Co., Chattanooga, Tenn., has secured a contract for 3,000 fire plugs for Brooklyn at a cost of $90,000.

Pointing out the remarkable extent to which the so-called "waste" water powers of the country are now being utilized, the Allis-Chalmers Co. has prepared a list of the recent installations in this line. Fifty-four equipments in all parts of the United States and Canada are listed. It is estimated that the aggregate horsepower of the hydro-electric plants of North America in which this company's apparatus is installed has reached nearly 900,000. This includes installations or orders for turbines alone, amounting to over 200,000 horsepower.

A mammoth gold dredge for service on the "Forty Mile" in the Yukon has been completed this summer by the Allis-Chalmers Co. for the Forty Mile Gold Dredging Co., Toronto, Can.

The Dodge Mfg. Co., at Toronto Junction, Ont., is turning out some machinery said to be heavier than any hitherto made in Canada. The work includes a massive iron-grooved wheel which is just being completed for the British Columbia Copper Co. It is 20 feet in diameter and 40 inches across the face, grooved for 18 ropes, and weighs 34,000 pounds. The company are also making for the Niagara Power Co. a series of large steel screws, each 33 feet long, eight inches in diameter, with a thread of ⅞-inch square and 1¾-inch pitch. The production of machinery of this size and type marks a distinct advance in the capacities of the Canadian iron and steel industry.

TRADE PUBLICATIONS.

The Russel Wheel & Foundry Co., Detroit, is distributing a book illustrating the work executed and in progress by this company. It comprises about fifty 9 x 6 pages filled with illustrations of steel plants, factories, paper mills, apartment houses, railroad bridges, cranes, lighthouses, valves, castings, etc.

The Crocker-Wheeler Co., Ampere, N. J., in bulletin 66 illustrates and describes the form W motor for rolling mills. This motor is built for 220 volts and for one speed only. It is either series or compound. It has been developed to meet the heavy demands of rolling mill service which requires a completely enclosed motor for intermittent and heavy, jerky work. It is built for 25, 50, 75 and 100 horsepower.

The Steel City Electric Co., Pittsburg, has issued a catalog describing "Star" bushings and other contractors' supplies for electrical work. These include outlets, insulator supports, beam straps, conduit benders, etc.